AMERICAN GAS JOURNAL

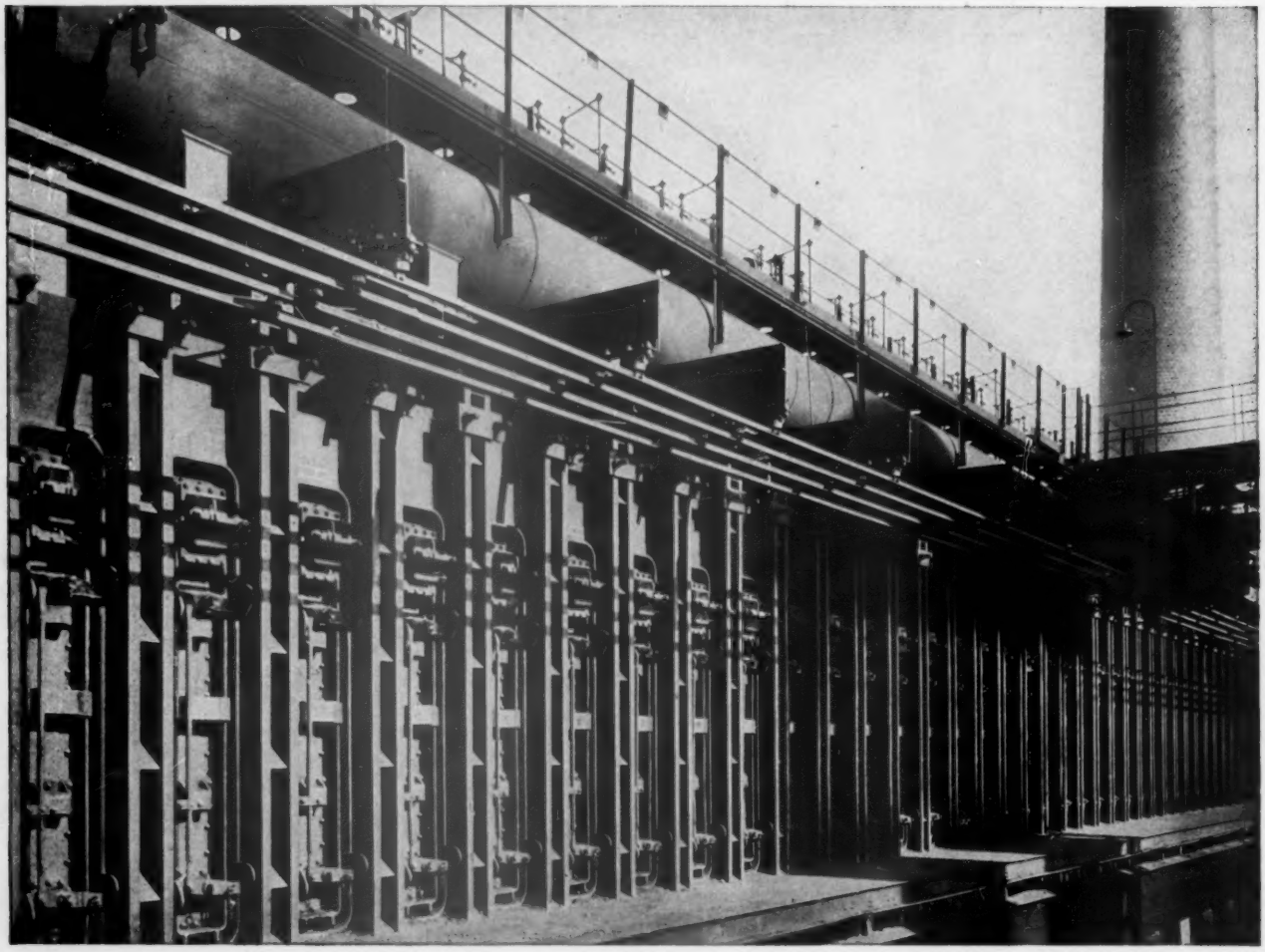
JANUARY, 1937

WILL CONTINUE TO BE
THE CHOICE OF
PROGRESSIVE GAS COMPANIES
WHERE FIRST CONSIDERATION
IS GIVEN TO
ACCURATE MEASUREMENT AND
UNIFORM PRESSURE CONTROL

PITTSBURGH EQUITABLE METER CO.
MERCO NORDSTROM VALVE CO.
MAIN OFFICES PITTSBURGH, PA.
ATLANTA BUFFALO CHICAGO MEMPHIS
NEW YORK COLUMBIA KANSAS CITY PHILADELPHIA TULSA HOUSTON LOS ANGELES OAKLAND

In Two Parts—Part I

BECKER TYPE
LOW DIFFERENTIAL
BY-PRODUCT COKE OVENS



KOPPERS OFFERS:

BECKER OVEN PLANTS . . . GAS PRODUCERS . . . WATER GAS PLANTS . . . LIQUID PURIFICATION PLANTS . . . PHENOL REMOVAL PLANTS . . . MATERIAL HANDLING PLANTS . . . BY-PRODUCT EQUIPMENT . . . BENZOL PLANTS . . .

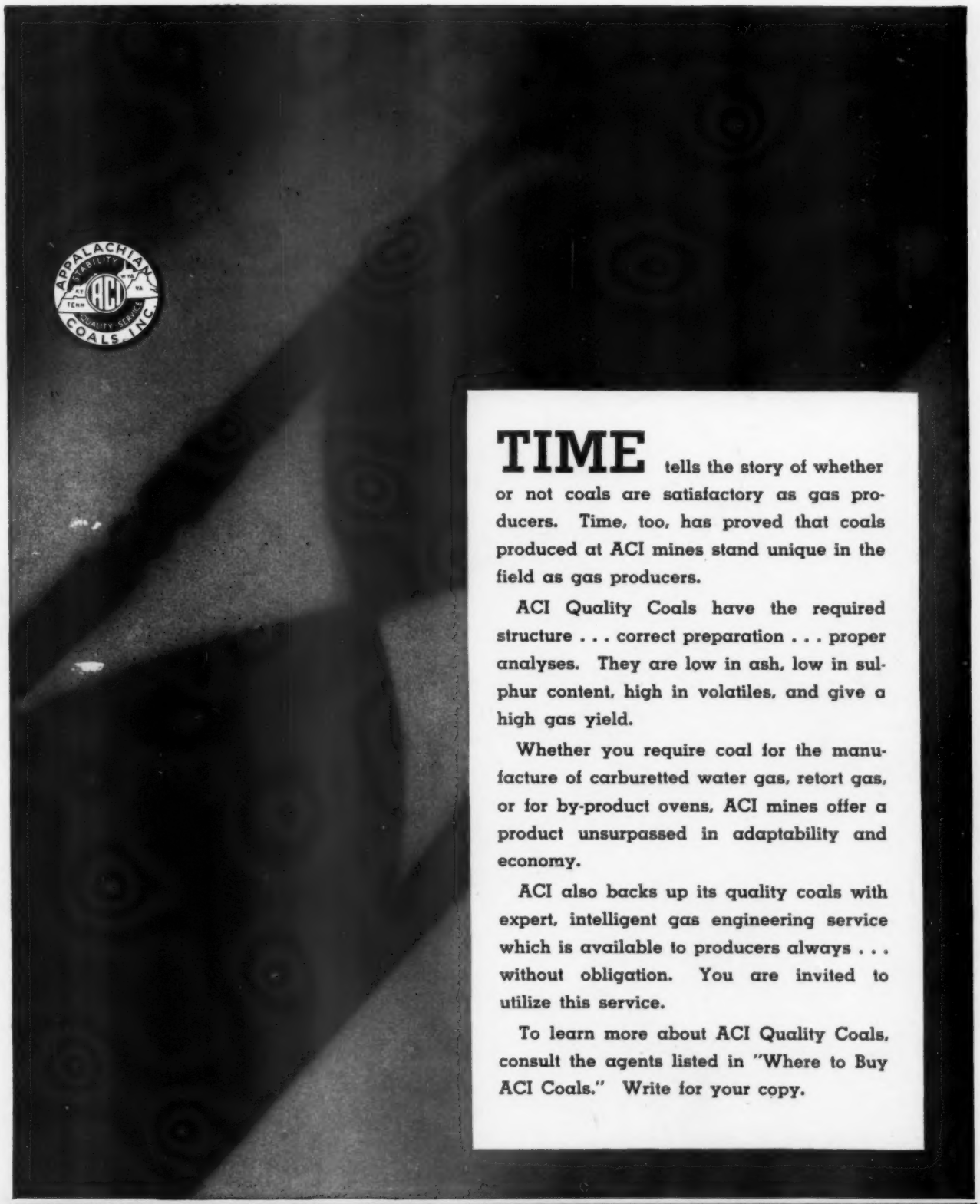
- The new BECKER OVENS, characterized by exceptionally low differential pressures represent an advance of prime importance in the economical production of gas and coke. Precise control of coke and gas quality is characteristic of these ovens.
- The pioneer installation at Camden, New Jersey, placed in operation in October, 1935, has already demonstrated a distinct advance in the art of coking. The use of the Becker Type Ovens should be considered in every building and modernization program in the gas industry.

KOPPERS COMPANY

Engineering & Construction Division

PITTSBURGH, PA.

AMERICAN GAS JOURNAL, January, 1937. Vol. 146, No. 1. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879.



TIME tells the story of whether or not coals are satisfactory as gas producers. Time, too, has proved that coals produced at ACI mines stand unique in the field as gas producers.

ACI Quality Coals have the required structure . . . correct preparation . . . proper analyses. They are low in ash, low in sulphur content, high in volatiles, and give a high gas yield.

Whether you require coal for the manufacture of carburetted water gas, retort gas, or for by-product ovens, ACI mines offer a product unsurpassed in adaptability and economy.

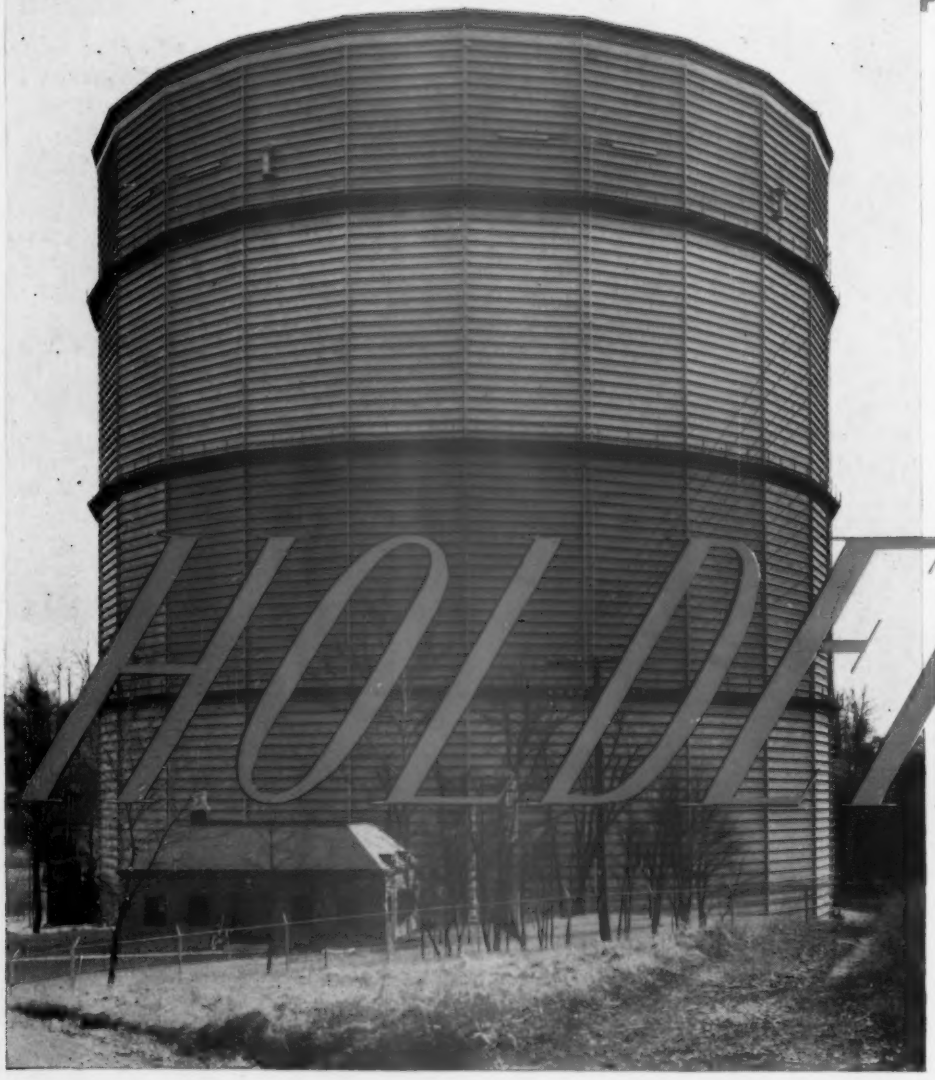
ACI also backs up its quality coals with expert, intelligent gas engineering service which is available to producers always . . . without obligation. You are invited to utilize this service.

To learn more about ACI Quality Coals, consult the agents listed in "Where to Buy ACI Coals." Write for your copy.

Appalachian Coals, Inc.

TRANSPORTATION BUILDING · · CINCINNATI, OHIO

The Only Waterless Holder With A Positive Fluid Seal



HOLDERS

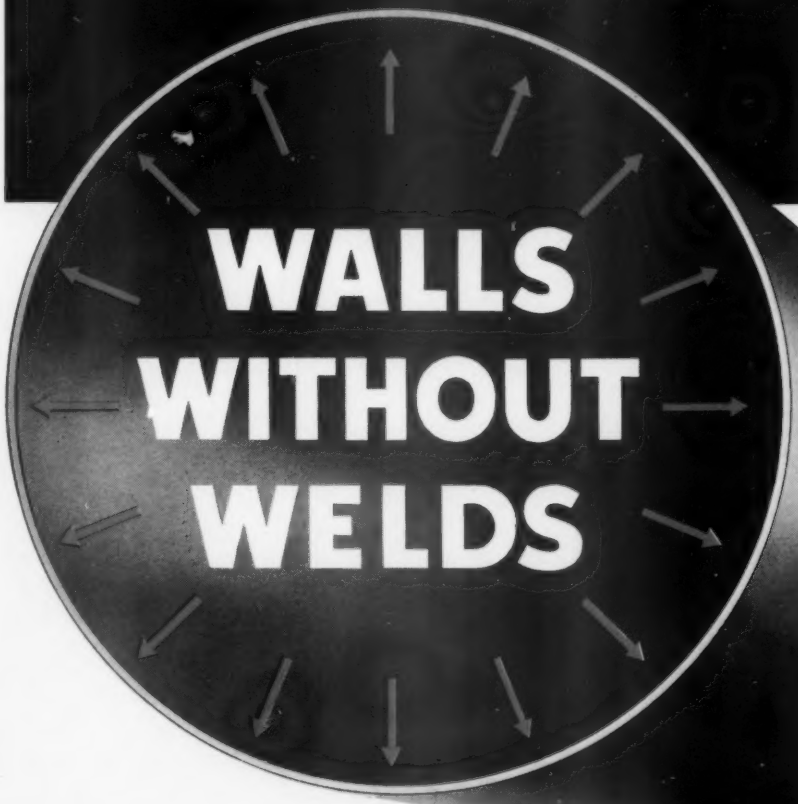
FIFTY-THREE Bartlett Hayward Waterless Holders are in service in America with a total capacity of 317,220,000 cubic feet.

The demonstrated advantages of the M. A. N. Waterless Holders have made this enviable record possible. Among these advantages are:

Improved appearance that removes objections to their location in residential districts. Greater capacity for the ground area occupied. Foundations are less expensive to build. All metal surfaces can be inspected. Hydrostatic seal has a uniform depth. Heating is eliminated for holders in outlying districts and the cost of heating near the works is greatly reduced. Maintains a uniform pressure. Operating and maintenance costs are lower.

If you are not familiar with the M. A. N. Waterless Holder, write for complete information.

NATIONAL *Seamless* PIPE



Pierced from SOLID STEEL!

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

TODAY

TODAY—A recent installation of mechanical joint cast iron pipe for gas service in the City of Philadelphia.

as 100 years ago

they're laying long-lived cast iron pipe but with modern bottle-tight mechanical joints.

A CENTURY AGO—A cast iron gas main in service in the City of Philadelphia for more than a century.

Where can you find another engineering material that has met the changing conditions of a century of gas service? Cast iron pipe is the same long-lived, economical material but with the addition of mechanical joints that are bottle-tight under modern working pressures. Proved so by performance and the A.G.A. laboratory. Made by CIPRA members for cast iron pipe in diameters from 1¼ to 84 inches.

CAST IRON PIPE

THE STANDARD MATERIAL FOR UNDERGROUND MAINS

The Cast Iron Pipe Research Ass'n, Thos. F. Wolfe Research Engr., 1013 Peoples Gas Bldg., Chicago

JOURNAL

Gas Flow Computers
High or Low Pressure

New Improved Gas Flow Computers (Either High or Low Pressure) Are Now Available in Durable Celluloid, Encased in a Convenient Leatherette Cover.

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

High Pressure Computer Range:

Cu. Ft. of Gas Per Hour—100-10,000 M
Diameter of Pipe Inches ¾-30
Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in. 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

PRICE $3.50 Each
SIZE 6½" x 8"

AMERICAN GAS JOURNAL
53 Park Place **New York**

VOLUME 146
NUMBER 1

AMERICAN GAS JOURNAL

WHOLE
NUMBER 3757

ESTABLISHED 1859

JANUARY, 1937

Contents

The Outlook of Gas—By Major Alexander Forward 11

Gas-Fired Rolling Furnaces Give Worthwhile Results on Wide Range of Metals 14

1937 16

Building the Househeating Load—Carl B. Wyckoff 18

Legal Effect of Public Utility Commission's Decisions—Leo T. Parker 21

A Sales Control System for Outside Salesmen—Fred Merish 23

What's Ahead in Sales—R. J. Rutherford 25

Pipe Corrosion and Coatings—Erick Larson 29

Grouting Machine Used to Meet Problem of Back-Fill Settlements—Dennis J. Manning 34

Gas Exhibit at Restaurateurs Washington Convention 35

The Economics of Energy Distribution—A. M. Beebee 37

New Gas Bake Oven Embodies Important Principles—J. B. Nealey 43

New Appliances 46

Industrial Division Meeting of New England Gas Association 48

Trade Literature 50

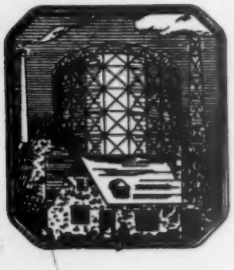
House Heating With Gas Topic of Sales Conference 52

News 56

PUBLISHED MONTHLY BY
AMERICAN GAS JOURNAL, Inc.
53 Park Place, New York

S. G. KRAKE, *Publisher*
A. M. GLEASON, *Secretary*
A. I. PHILLIPS, *Editorial Director*

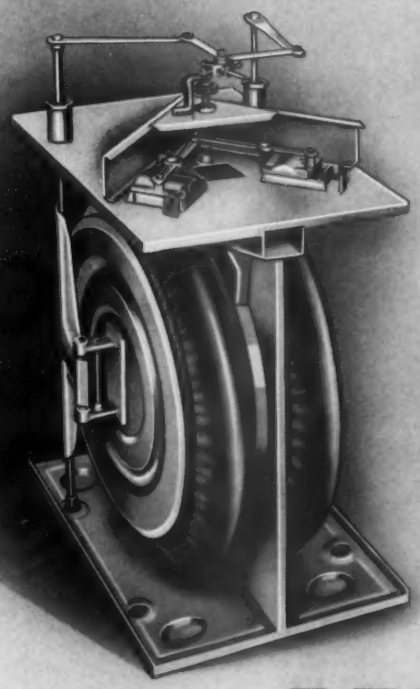
ADVERTISING REPRESENTATIVES:
THOMAS MORGAN, *168 N. Michigan Ave., Chicago, Ill.;* HARLEY R. MANKIN, *515 Guarantee Title Bldg., Cleveland, Ohio;* ARTHUR K. AKERS, *Tutwiler Hotel, Birmingham, Ala.*



Copyright 1937, American Gas Journal, Inc.

Subscription $2.00 per year U. S. A.; $3.00 Canada; $4.00 Foreign. Single copies, 25 cts.

COST CONTROL *through* PERFORMANCE CONTROL



Only your meter history records, logically classified for comparative performance, can show how modern your meters are . . . the itemized cost of maintained accuracy in gas measurement . . . the information needed to evaluate the actual return on your meter dollar.

The advances which persistent research has made in the scientific knowledge of gas measurement . . . and their application in the development of American meters . . . make today's meter standards new standards in the low cost of **MAINTAINED** accuracy.

They offer an opportunity for reducing costs as a part of your modernization program.

796

Established 1836

AMERICAN METER COMPANY

INCORPORATED

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK, N. Y.

IT is difficult to understand why so many utilities needlessly complicate the handling of complaints and inquiries. Certainly at no other time is simple, direct, clean-cut service so vital from a goodwill standpoint. Yet day after day, customers are made to wait and wait (or are referred to half a dozen different people) before they can get their questions answered. To them, this treatment can mean only one thing—the company is "passing the buck."

If this problem happens to be yours also, here is news. A new system developed by Remington Rand makes it possible to concentrate all customer contacts at one central point, with important savings in time and operating costs.

Given proper facilities, one group of clerks can handle the following:

1 Duplicate Bills
2 High Bill Complaints
3 Appliance Complaints
4 Service Complaints
5 Applications for Service
6 Security Deposits
7 Extension on Delinquent Bills
8 General Inquiries regarding the Account

Each individual clerk can quickly become familiar with *all* these activities. This means fewer customer waits at peak periods, and more efficient use of all clerks' time throughout the day.

From the standpoint of public relations alone, it will pay you to eliminate the usual red tape involved in customer contacts. Phone the Remington Rand office in your city or mail coupon for complete facts on Centralized Customer Contact.

One of Remington Rand's Customer Contact Desks in use at a leading midwest utility.

Ok.. it's from Remington Rand

MAIL COUPON TODAY

REMINGTON RAND INC., DEPT. U-41
465 Washington Street, Buffalo, N. Y.

Please send me complete facts on Centralized Customer Contact.

Name .....

Street Address .....

City ..... *State* .....

JAN 15 1937

©CIB 324721

JANUARY 1937

AMERICAN GAS JOURNAL

VOLUME 146
No. 1

The Outlook for Gas

By Major Alexander Forward

Managing Director
American Gas Association

AFTER a protracted period of uncertainty, the gas industry is slowly but surely emerging from what has been one of the worst depressions in history, and appears to be reaching a condition of real stabilization if not actual prosperity. In my opinion, there never was a time when the fundamentals of the gas industry were sounder than at present, and, to me, there would appear to be no obstacles of a sufficiently serious character to prevent it making great forward strides within the next few years.

The past year was one of pronounced if not continuous progress, in which the tangible gains of 1935 were consolidated and further advances recorded. This recovery is eloquently reflected in the estimated American Gas Association statistics which show that, even though revenues were slightly lower than those of 1929, aggregate sales of manufactured and natural gas were the largest on record, aggregating 1,600,000,000 thousand cubic feet, a consumption that exceeds the 1929 figure by more than 200,000,000 MC.F. If gas consumed in the manufacture of carbon black and utilized for other field purposes had been taken into the calculations, there is no doubt that the total gas used in the country would have amounted to more than 2,000,000,000 MC.F.

Number of Gas Customers at All Time High

A new record high was established also in the number of the gas industry's individual customers, which reached an approximate figure of 16,500,000, an increase of 387,000 over 1935, and greater by more than 570,000 than in 1930.

Aggregate revenues for 1936 approximated $775,000,000, an increase

ALEXANDER FORWARD

of 6.4 per cent over the previous year, and while these are less than the highest of all time, they are nevertheless only $10,000,000 below the record figure.

An analysis of the revenue figures show that the manufactured gas companies, serving more than 10,000,000 customers, earned approximately $375,000,000, a gain of 1.4 per cent over 1935, while the natural gas companies, serving approximately 6,225,000 customers, had total revenues of approximately $397,000,000, an increase of 11.6 per cent, placing this division of the industry in first position from the revenue point of view.

The Trend of Manufactured Gas

The figures for manufactured gas clearly demonstrate the trend of this industry toward a greater application of the fuel to industry and commerce and to house heating, for whereas domestic sales, approximating 218,000,000 MC.F. decreased 1.9 per cent, industrial and commercial sales, approximating 113,583,000 M C.F. increased 20.6 per cent, and whereas revenues from domestic sales decreased 2 per cent, those from industrial and commercial sales increased 11.6 per cent. A particularly gratifying feature was the increase in the sales of manufactured gas for house heating, which, aggregating 41,171,000, registered an increase of 16.7 per cent over 1935, and exceeded by nearly 300 per cent the gas utilized for this purpose in 1929.

Natural gas, with approximate total sales of 1,233,000,000 MC.F. increased 18.8 per cent, showed even a more pronounced advance reflecting of course, the national recovery, its sales in the industrial division showing an increase of 23.9 per cent, and in the commercial field a gain of 13.5 per cent. Domestic sales increased 9.4 per cent. Total revenues for the natural gas industry increased 11.6 per cent.

Statistical Record Not a True Barometer

Necessarily, the statistical record of any industry is not an accurate barometer to its actual position, for frequently other uncontrollable factors enter the situation. So it is with the gas industry. Revenues have not kept pace with sales for several reasons, the chief of these being voluntary reduction of rates to promote volume; increasing operating expenses, and a marked improvement in the efficiency of appliances, reducing materially the amount of gas required to perform a particular

operation. These factors we shall consider later.

Great Increases in Gas Appliance Sales

Increases in the sale of gas appliances have been equally pronounced. During 1935, approximately 1,100,000 gas ranges were sold, a figure that probably exceeds the total number of electric ranges in use throughout the country today. Preliminary estimates for 1936 indicate sales last year of nearly 1,500,000 ranges, a figure that represented a gain of 50 per cent over the previous year, and was only slightly below the all-time peak of 1929. In addition, untold thousands of gas appliances, including water heaters, refrigerators, and house heating units, were installed. It is probable, too, that installations in industrial and commercial fields exceeded those of any previous year.

Striking improvement in the design and efficiency of gas appliances has been one of the outstanding developments of recent gas history, and has contributed measurably to the advancement of gas, which is now in a position to compete on more than favorable terms with any other heat agent. Great credit must be given to the manufacturers who have shown such willingness to progress, and no less credit to the members of the American Gas Association who have served so faithfully and energetically on the various committees, which, in conjunction with the Association's Laboratories, have brought about safety in use of the modern gas appliance. The requirements for testing and certifications are being made more stringent year by year, and although many of the appliances submitted have to be returned for change or modification, no one can, or does doubt the efficiency of the Association's testing program.

Achievements of Section Chairmen and Members of American Gas Association

Appreciating the fact that this is not the occasion to discuss the functions and activities of the American Gas Association, I feel, nevertheless, that no article could be written on the industry without at least some reference to two phases of its activities, namely, the splendid work of its general and sectional committees, and its far-reaching advertising campaign, which unquestionably is destined to be a potent force in the future development of gas.

I can not adequately express my own feeling concerning the way in which the personnel of our great industry is voluntarily lending its brains and time to the upbuilding of gas. I do not believe that any industry in the country has more loyal men in its ranks, or men inspired with a finer sense of honor. They have been instrumental in inoculating the industry with faith and optimism, and through their contributions to research, education, and publicity, have aided in the achievement of objectives whose value to the industry can not be translated into monetary terms.

Our presidents, vice-presidents, section chairmen, and directors, constituting the Executive Board, are men who freely devote days and weeks to the advancement of the industry. No one could give better support and cooperation than they do.

The $1,500,000 Cooperative Advertising Campaign

Now a few words as to our national cooperative advertising program, which contemplates the expenditure over a period of three years of the substantial sum of $1,500,000 for the advancement of gas. The underlying purpose of this great campaign, initiated by the Executive Board, and planned in its smallest detail by the most competent authorities obtainable, is to educate the general public to the advantages of gas fuel and gas appliances, stressing particularly the remarkable improvements that have been made in industrial and domestic gas equipment within recent years. This advertising is being run in twenty-six national and trade publications, with an aggregate circulation of 15,500,000. During the first year, the Association will present definite facts in order to show that the gas industry is alert, progressive, and able to render a superior fuel service to the public. It will also emphasize the qualities of gas as a fuel, and its utter dependability and controllability.

Supplementing these 90,000,000 pages of four-colored advertising is a radio program, the "Mystery Chef," a cooking feature that is reaching a total of 8,000,000 metered homes.

The Roseate Outlook For 1937

Now as to the outlook for 1937, activity of industry and commerce has reached a sufficiently high degree of acceleration to warrant the prediction that a definite improvement in all fields of national enterprise is to be expected. Unfortunately recent progress has not been sufficiently pronounced in the durable goods and construction industries to absorb the millions of men and women on relief, but the definite advances that have been made are influencing, in measure at least, all branches of industry, and it is reasonable to assume that these advances will continue.

In common with all other industries, gas is bound to experience its fluctuations. It cannot be immune to the pressure of such natural laws as that of supply and demand. But it can be said for gas that it has never experienced the violent fluctuations and repercussions that have so demoralized other major industries. A significant characteristic of gas is that in periods of depression it is almost the last industry to feel the full effect of severe economic decline. This, of course, means that it is among the last industries to recover. In the early stages of a depression there is generally a swift decline in prices of raw products, and as one of the larger disbursements of the gas industry is for coal and other raw material, there is a decline in the operating ratios, with substantial increases in net incomes. Conversely, as recovery becomes more accelerated there is a compensating rise in the prices of raw material, a condition which naturally increases operating ratios and curtails profits.

Gas Withstands Every Depression

Throughout its history gas has always emerged from periods of business reaction in a slow, orderly manner, and in a strong position as to assets and resources. So it has been with the depression that has just passed, and so, no doubt, it will be in the future. Other periods of retrenchment may come, but in the conditions of the present I think that gas can assume a progressive, militant front.

Like all other industries, gas is subject to competition, but that does not mean that it cannot meet it. Almost every industry is required at some time to adapt itself to changed conditions. At one time, the Model "T" Ford was the only low-priced automobile, and had therefore practically no competition. However, when other manufacturers entered what had been its exclusive field the company was forced to change its cars radically in both design and engineering, and thoroughly modernize its sales methods as well.

So the gas industry, too, must also be ready to adapt itself to the economic changes that may come, being ever alert to attune itself to the business trend. It cannot afford to stand still, and, because of the vision and action of its leaders, I am sure it will not. Ours is not a moribund industry, nor can it be a static one. It must either go forward, or retrogress.

The Importance and Indispensability of Gas

Ours is a great industry, absolutely vital to the nation's welfare, and I, for one, have never been willing to admit that, except in the sphere of illumination, where electricity enjoys a distinct advantage, any other fuel can surpass in efficiency, cleanliness, convenience, or economy, this great source of heat, which, more than any other fuel, has been the liberator of man.

Figures alone cannot tell the story of the gas industry, which, with a capital investment of approximately $5,000,000,000, serves through its 266,400 miles of mains, more than 80,000,000 people. Then must be taken into consideration its great but intangible effect on the prosperity of other industries and the country as a whole. In a given year the manufactured gas industry purchases more than 10,000,000 tons of coal and coke and 500,000,000 gallons of oil, while annually it expends millions upon millions of dollars in construction and rehabilitation of plants, in the laying of pipe lines, and in the purchase of machinery, thus contributing greatly to the prosperity of the heavy industries. The gas industry was a major factor in acting as a cushion against the full brunt of the depression for more than one industry, as can be seen from the fact that between 1929 and 1933 more than 5,000 miles of pipe lines were constructed for the natural gas industry alone.

Every Challenge to Gas Has Been Met

Gas has met successfully its every challenge, and will again, for as a fuel it can do far more, and do it more efficiently and more economically, than any other heat agent. When the electric light became an active competitor in the field of illumination, the leaders of the gas industry did not give up, but, awakening to the peril that faced them, developed other uses for gas, not alone to guarantee the survival of their industry, but to point it to an even larger future. So, the leaders of the gas industry are meeting the problems and difficulties of today.

The Immediate Future of the Industry

Now as to the immediate future of gas. As the most ideal heat agent for practically all domestic purposes, gas will unquestionably retain its supremacy in this particular domain. Increased business, attributable in part to continued recovery, but in even greater measure to the projected nation-wide housing programs, will no doubt be experienced by the gas companies, although the constantly greater efficiency of gas appliances may result in some reduction of unit consumption. This will mean, of course, that volume increase in the sale of gas can come only from new installations. However, even though the modern range may result in some loss of volume per appliance, it will have the very salutary result of placing the gas distributor in a position to compete even more successfully than now with other fuels.

One of the outstanding developments of 1935 was the widening of the market for domestic water heating, influenced to a material degree no doubt by the favorable gas rates instituted by the companies in an attempt to secure a greater portion of this ever-growing business. It is estimated by the Association's statisticians that the sales of automatic gas water heaters increased at least 50 per cent in 1936.

Rate Concession Policy

Rate concessions were also made on a wide front in the domain of house heating, which, in conjunction with active sales campaigns, resulted in greatly increased sales. There was a pronounced increase also in the number of central heating plants and space heaters, and the sustained improvement of the past two or three years seems to be gaining greater momentum. It is estimated that the number of customers using gas for house heating increased 28 per cent in 1936.

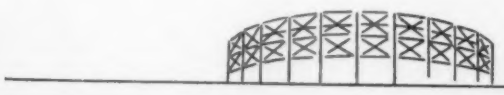
The Application of Gas to Refrigeration

Gas refrigeration is a comparatively recent development, yet the gas manufacturers are competing successfully, and on a national basis, with electricity in this important field. The fact that they are able to do so in such popular areas as New York City would seem to indicate that refrigeration with gas from a competitive standpoint is economically feasible. It is estimated that at the end of 1935 approximately 1,250,000 domestic gas refrigerators were in use, compared with 6,200,000 electrical machines. A good omen is the fact that sales of gas refrigerators increased 56 per cent in 1936, whereas sales of electrical units increased only 15 per cent.

Gas in Industry and Commerce

The use of gas for commercial and industrial purposes is increasing rapidly throughout the country, as new outlets for its utilization are found. Recent marked improvements in applying gas heat, particularly in the metals, ceramic, food manufacturing, and food preparation fields have caused the sales of both manufactured and natural gas to break predepression peaks. Through the Association's policy of cooperative research with manufacturers new practices of gas application are being constantly developed. Gas, for example, is now being used in a large way in the enameling industry, it having been found an ideal heating agent in glazing both sheet steel and cast iron. It is being used, too, in many other processes where application of direct heat is required. A return to gas by the newspapers for stereotyping has been one of the recent industrial developments, and no doubt there are many other industrial and commercial uses where business finds its employment advantageous.

In conclusion, I would say that our industry's needs today are close and cordial co-operation, co-ordination of effort, a willingness to give as well as to take, service to our public, justice to ourselves—these are the foundation stones on which we must build the edifice of the tomorrow.



Gas-Fired Rolling Furnaces Give Worthwhile Results on Wide Range Of Metals

Some European Results Discussed

By A. J. G. Smith

THE rolling or drum type of melting furnace is one whose possibilities should be better known both to the gas man and the foundry industry. The type is of course no novelty, but the use of such furnaces has never been developed in other countries to the same extent as in Germany, for instance, where they are extensively used for melting metals ranging from white metal and aluminium at one end of the scale up to steel at the other. They are of proved utility in the iron foundry where castings have to be produced to close specification limits as regards carbon content. The photograph reproduced in Fig. 1 shows a typical furnace of this class made by the Fulmina Company, of Mannheim, Germany. The principle is simple, as it consists in essentials merely of a cylindrical drum-shaped metal casing, lined with firebrick. The drum is arranged horizontally, and at each end of the casing are two accurately machined bearing rings which serve to support the furnace upon two pairs of rollers running in ball bearings. One pair of rollers is rotated a certain number of revolutions in each direction by a small electric motor operating through reduction gearing, which serves to rock the furnace to and fro during the progress of the melt. This not only ensures a homogeneous metal, but also assists in prolonging the life of the lining by equalizing the temperature conditions in the melting chamber. The burner is of the air blast type using city gas with an air blast at 12 to 20" water gauge pressure. For dealing with metals with a high melting point, this blast is always strongly pre-heated. The charging door, in the case of small furnaces, is arranged on the periphery of the drum, but more frequently in European designs at the end of the casing opposite to the burner, from which end the products of combustion are also evacuated. The pouring spout is arranged in the periphery slightly above the center line. In most cases the molten metal is poured into a ladle for transport to the molds, but the smaller sizes of furnace can be made portable, Fig. 2 shows a variation of the type in which trunnion mounting is utilized, the trunnions being carried in a forged steel bail, the latter resting upon half bearings on cast iron "A" standards. This arrangement allows the whole furnace to be picked up by means of a crane on the completion of the melt without any intermediate handling and cooling of the metal in ladles.

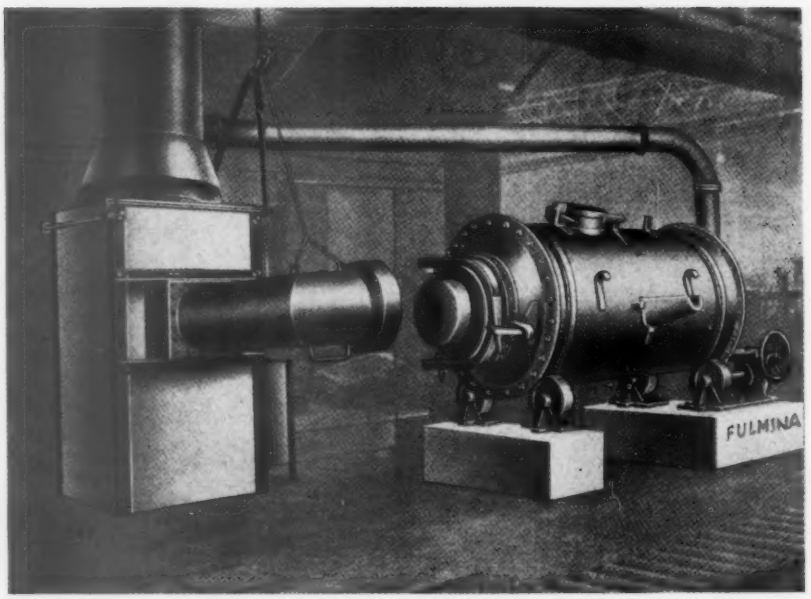


Fig. 1. Gas fired rolling furnace

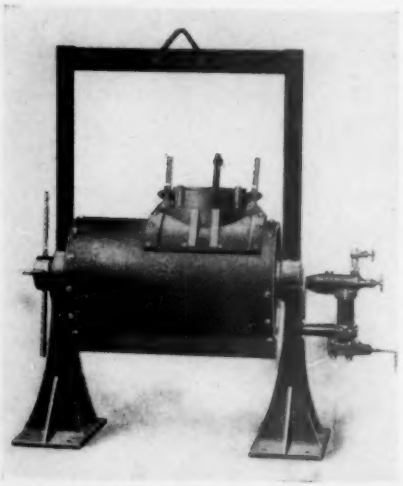


Fig. 2. Rolling furnace with ball suspension.

Life of Linings

No crucibles are employed in this system, the melting being done in the melting chamber in contact with the products of combustion and the

firebrick lining. This latter is formed of standard firebricks and under normal foundry conditions has a very long life which is partly accounted for by the fact that the rocking of the furnace during the progress of the melt assists in maintaining an even temperature through the lining. In grey and malleable iron melting a life of 200 melts per lining is not uncommon, while in the non-ferrous industry instances have been known of a lining lasting over a couple of years on aluminum melting, during which time 5000 charges were put through the furnace.

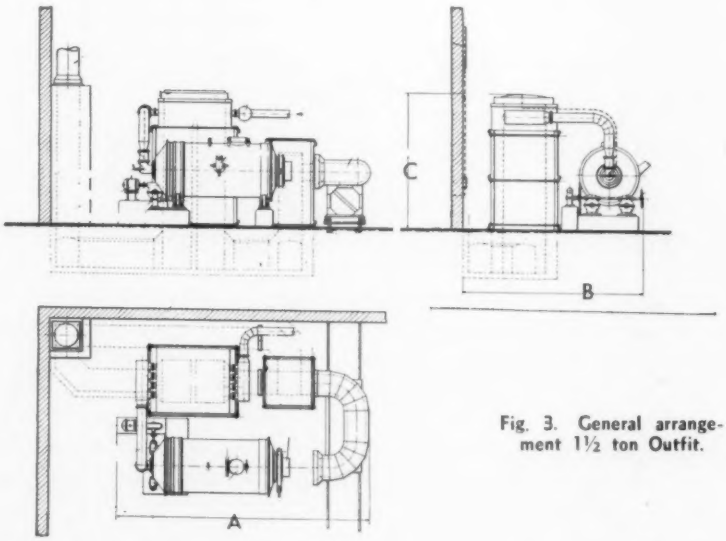


Fig. 3. General arrangement 1½ ton Outfit.

Much of the efficiency of these furnaces when handling metals with a high melting point depends on the means employed for preheating the air supply. In Fig. 3 will be seen the general arrangement of a typical outfit embodying a 1½ ton furnace with such a preheater. This latter consists essentially of a number of "U"-shaped tubes in heat-resisting metal located in a chamber lined with refractory, and the design shown enables the air blast to be preheated to approximately 600 degrees C. if necessary. To connect the air heater with the furnace, a brick-lined connecting piece is provided, which is either hinged as shown in the photograph Fig. 1 or mounted on wheels so that it can be readily moved to provide access to the furnace end for recharging.

Results on Ferrous Metals

One of the most useful fields for the rolling furnace is the melting of malleable iron or metals which have to conform strictly with a certain chemical composition or physical properties. In the automobile field, the English Ford plant employs two rolling furnaces of German construction (the Schmitz) each of 5 tons capacity for melting malleable iron for crankshafts. The calorific value of the gas in this case is 450 B.T.U., the pressure 12", with air blast at 20 to 24" pressure preheated to 500 degrees C. The melting time for 5 tons is 3½ to 4 hours, and the gas consumption 13,500 to 14,500 cubic feet per ton. In the case of furnaces of a smaller size, a 1½ ton Fulmina furnace as shown in Fig. 1 gives the following results upon full charges of malleable iron: melting time 1 hour 45 min. to 1 hour 50 min., the gas consumption varying from 15,000 to 17,000 cubic feet per ton. The castings in this case have to conform to the following specifications:

C	Si	Mn	S
2.36	1.3	0.28	0.054
2.52	1.09	0.30	0.045
2.42	1.14	0.29	0.046

with a Brinell hardness of 114, tensile strength 22.8 tons, and elongation 12.7%.

For melting grey iron a smaller furnace of ½ ton capacity of the same make gives the following results as normal:

Heat	Weight of Charge cwt.	Melting Time min.	Gas per Ton (including heating up) cu. ft.
1	9	90	13,650
2	9	75	11,550
3	10	65	10,100

The rolling furnace has also been found extremely useful in the iron foundry for the duplexing process, that is working in conjunction with the cupola where iron has to be produced with a low carbon content. In this case the metal is brought down in the cupola in the usual way and then run off into a heated rolling furnace for the superheating or refining heat. Typical working results on this process are:

Weight of Charge cwt.	Temperature of Charge deg. C.	Raised to deg. C.	Time min.	Gas Consumption cu. ft.
4	1300	1400	15	1060
6	1300	1500	30	2472
24	1250	1450	35	9183
36	1380	1500	30	6710

The Non-Ferrous Foundry

The rolling furnace is also considerably used for non-ferrous metals, and for this branch of work the following results are representative of general European practice in the Fulmina furnace. These results are obtained on ingot metal and in a furnace equipped with air heater:

Metal	Gas per Ton cu. ft.	Melting time in min. for 3 cwt.	10 cwt.	20 cwt.
Red brass	5250-4350	35-40	45-50	55-60
Gunmetal	5250-4350	45-50	55-60	65-70
Aluminium	6300-5250	25-30	30-35	35-40
Copper	7000-6300	50-55	60-70	70-80

When dealing with fine swarf of leaded bronze, the following are typical results obtained:

Charge	882 lb.
Weight of metal poured	849 lb.
Melting loss	3¾%
Melting time	30 min.
Melting time including refining heat	38 min.
Gas consumption per lb.	1¼ cu. ft.

The foregoing figures which have been selected from results on a wide range of metals will be sufficient to show that the rolling furnace is a type which is deserving of careful study, and one which could in many plants be advantageously used both for the purpose of decreasing fuel consumption and speeding up output.

Changes in Personnel of Public Utility Eng. & Service Corp.

Henry C. Cummins, vice president in charge of operation and engineering of Public Utility Engineering and Service Corporation, announces the following appointments and changes in title among executives in the operating and engineering department of the organization:

E. D. Uhlendorf, executive engineer; F. H. Lane, manager, engineering division; A. H. Kuhn, manager, valuation division; G. E. Potter, assistant to executive engineer; W. B. Rittenhouse, assistant to manager, engineering division; W. C. Drummond, power production engineer; H. W. Eales, chief electrical engineer; H. S. Whiton, chief mechanical engineer; H. G. Robey, chief hydraulic engineer; L. J. Willien, chief gas engineer; W. J. Welch, chief design engineer; Stephen Wehner, hydraulic engineer; D. C. Hormell, mechanical engineer; H. O. Mathews, automotive engineer; J. A. Agee, budget control engineer.

1937

A NEW YEAR! New opportunities, new problems, new conditions, and with all of these a continuation by our industry of its ceaseless effort to improve and extend a service which is perhaps the most reliable and unfailing that is produced by man!

Behind us lies an unparalleled record of service to the public extending back over a century and a quarter. Ahead is a broad and very real field of opportunity; but to turn opportunity into achievement requires vision and hard work.

We of the gas industry have no fear of hard work, nor of tackling and doing jobs which others say cannot be done. But are not most of us a bit too practical, a bit too close to the details of our business to picture the vast opportunities open to us? Universal gas house heating. A commercial and industrial load many times what it is today, with unprocessed fuels being used in only the crudest forms of heating operations. Perhaps you smile, so did many of **us** when the automobile industry set out to make its product the universal means of highway transportation. Every age has had its skeptics, but the men who have dreamed of seemingly impossible achievements have been the ones whose influence has been responsible for the development of our country. We say: "If it is done with heat you can do it better with gas," and "Gas is the universal fuel." Have we not the faith, vision and ability to convince the public of the former and thus make the latter a fact?

If we are to do this we must begin by thinking and saying less about our difficulties and minor disappointments. We must stop belittling our progress and accomplishments and make them matters of common knowledge. How little attention we pay to the really fine history of our industry, and how clumsy most of us are in trying to tell the public of its ideals and traditions. Any of our competitors with a record such as we have would be broadcasting it to the world in the most colorful manner possible. So, during 1937 let us stop talking so much about our troubles, —if we are not careful we shall succeed in convincing ourselves and the public that that is all we have. Let us rather talk about our accomplishments, and try to vision and to plan how we may take practical advantage of the vast fields of opportunity open to us under present or probable future economic conditions.

It has been said that the gas industry is awake but has not yet got out of bed. Undoubtedly many companies ought to bestir themselves a bit; but what is needed fully as much is a change in mental attitude, and an appreciation of the fact that the industry is right now accomplishing things that it has reason to be proud of.

Take, for example, the following: **During the first eight months of 1936 the gas industry gained nearly 100,000 customers. It sold 910,000 gas ranges, an increase of 28 per cent over the corresponding period of 1935; and when the figures are all in we shall probably find that the total number installed during the year was about 1,400,000. Sales of automatic gas water heaters increased 50 per cent; gas fired boilers 86 per cent; gas furnaces 148 per cent and gas conversion burners 102 per cent. Revenues from commercial and industrial users increased 16.1 per cent, and total revenues increased 6.8 per cent.**

In the last annual report to the stockholders of The Commonwealth and Southern Corporation, a company predominantly electric, appears the following significant statement. "It is frequently said that this is the electric age and that by comparison the gas industry is not progressing. . . . Comparative figures show that the total electric sales in kilowatt hours increased 13.62 per cent in 1935 over 1934 and the electric customers increased 4.36 per cent. The gas sales in cubic feet on the other hand increased 14.22 per cent and the number of gas customers increased 5.49 per cent in 1935 over 1934."

In the face of such records as these, records that we should be proud to talk about, many of us persist in concentrating our attention on a somewhat gloomy post mortem over the comparative stagnation of residential gas sales. The first eight months of 1936 showed an increase in residential sales for the industry as a whole of only 3.0 per cent, whereas the manufactured gas industry taken alone exhibited a decrease of 1½ per cent.

We may as well admit that these figures are what they are. A better showing would indeed be welcome, but perhaps there are excellent reasons why this branch of our business has failed to show much gain and why its future growth may continue to be slow compared with that in the other newer and potentially larger fields open to us. In any event, why not concentrate more attention on those branches of our business which are going strongly ahead and where dollars are to be made, rather than harp continually on the one where economic conditions make the pennies more difficult to earn.

Do not misunderstand us. We do not advocate letting up one iota in our efforts to expand our residential business and maintain our enviable record of last year in selling residential appliances. But we do believe the industry should recognize and calmly accept those conditions which have resulted in relatively smaller usage of such appliances and give more thought and attention to those branches of our business that are expanding rapidly. So during 1937, let us show a little pride in our successes

and not try to bury them under the proverbial bushel.

With respect to residential sales, we must definitely recognize that less and less cooking is being done in the home. Domestic bread and cake baking is becoming almost a lost art. Prepared and precooked canned foods are coming into use more and more. People are eating less at home and more in restaurants. The old time Monday washing load and Tuesday ironing load is almost a thing of the past. **But the need for heat is not lost. It is merely transferred from the home to the commercial establishments,**—the bakery, the cannery, the restaurant, and the laundry. We cannot stop the transfer of the load, but we can follow it; and the fact that we are doing so is reflected in our increased commercial sales.

This bugbear, residential competition, is another factor about which many of us get unduly disturbed and do unduly little. The cost of our service and the efficiency, convenience and appearance of our appliances puts us in a position to compete successfully with any other fuel in the residential field; but in most instances **our sales forces lack man power.** Count up the number of salesmen in your organization and compare it with the number employed by your competitors. Time and again it has been shown that high grade man power, well directed and backed up by publicity produces results; and within reasonable limits, the greater the man power the greater the results. **Add an attractive rate form to an adequate sales force and we have no cause to fear competition.**

Again, do not misunderstand us. Meeting competition does not mean success in making every sale. Even if our competitors were to give away their appliances, very many persons would still prefer gas; and conversely there will always be some who will prefer or be sold coal, oil or electrical appliances. We must expect to lose some sales and we must expect to see some gas appliances replaced by other types; but, we in turn, should be securing our fair share of sales and displacing appliances of our competitors. That this is being done is evidenced by statistics and by the collection of coal, oil and electric ranges taken in trade and found in the storeroom of almost any gas company. So when we fail to make a sale or see one of our gas appliances displaced, consider it only a normal business casualty. Tomorrow you should and probably will go out and take two or three from your competitors.

While we have had competition for many years, few of us have really faced the fact until recently. We have had things too much our own way to be good for us. Now we should not only get out of bed but should approach the work ahead with the anticipation and confidence which opposition should stimulate and at the same time realize that much of the industry has been doing and undoubtedly will continue to do a job to be proud of.

What of the future? An editor is not supposed to predict, but only to comment on facts and conditions. However, we must judge the future by the present and past and by the trends of the times.

One of our chief competitors is fuel oil. Thus far it has been sold almost as a by-product of gasoline. The petroleum industry has only limited flexibility in the production of various products from crude oil, so the prices of these products must be adjusted accordingly. In the past the basic demand has been for motor fuel. In an effort to effect a balance, the oil industry launched a tremendous drive to create a market for fuel oil in the home and in industry. Now there are distinct indications that a balance has been reached; and if that is true then the price must inevitably be raised to control the market. The momentum of the effort to sell fuel oil may create an even greater demand before it is arrested. Here is an opportunity for the gas industry. It should be watched and exploited to the utmost.

There are rumblings of industrial warfare in many sections of the country. What will be the situation in the coal industry? We dare not predict. It likewise should be watched and full advantage be taken of it. A coal strike in the early years of this century helped pave the way for an era of prosperity in our industry.

These possible future conditions present both problems and opportunities. An entirely different situation may develop. But the industry which is best prepared to meet its problems and to take advantage of its opportunities is the one which has the brightest future prospects.

In meeting our problems few industries are our superior; in sizing up our opportunities we are ultra conservative and pessimistic. Look back a dozen years. Gas house heating was generally regarded as an undesirable load and one which we must be prepared to handle only because the public would probably demand that we do so. Few companies really sought it, and a suggestion that it could be supplied at substantially less than one dollar per M was regarded as the wild dream of a perverted imagination. With hesitation and forebodings many companies embarked on their first gas house heating campaign after watching the apparent though modest success of some more adventuresome neighboring organization. The growth of this business and the steady decrease in rates for it are matters of history, though even today many companies are still trying to shake off their fear of the peak-load bugbear.

Here was an opportunity which we took in because we thought it was knocking on our door and would soon force entrance. Few of us went out to meet and welcome it; **yet it is today one of the great potential fields of expansion open to us.** A slight economic readjustment and it might be ours almost for the asking.

Building the Househeating Load

By Carl B. Wyckoff

Househeating Dept., Public Service Company of Colorado
Denver, Colorado

AT the beginning of the year of 1936 the Gas Househeating Sales Department of the Public Service Company of Colorado found old man "Bogie" looking them straight in the eye. While the results attained for the year of 1935 had been gratifying indeed, and much had been accomplished towards recovery from the slump caused by the depression, still there was quite a task ahead of them to turn the 8c per MCF voluntary decrease in househeating rates given late in 1934, into a profit for the company.

Briefly reviewing the situation, the househeating peak in Denver had been reached in May, 1932, when there were 10,180 jobs on the line. From this maximum the number dropped to a minimum of 8160 on August 31, 1934—a net loss of 2020 customers.

September 1st of 1934 a voluntary reduction of 8c per MCF on all gas consumed per month in excess of the first 3000 cubic feet was given. This meant a saving of $15.20, or 13.4% per year to the average househeating customer, and as had been anticipated, helped very much in stemming the tide of losses. Still the task ahead of the sales division was tremendous, as of course much had to be accomplished to overcome this rate reduction in the form of net income.

Well Trained Sales Organization

Fortunately, the company had a splendid well-trained sales organization which, in their wisdom, they had retained during the lean years. This personnel was increased about 50% and clear-cut, intensive sales programs were outlined, with the result that at the end of the year of 1935 a net gain for the 16 month period of 1353 domestic space heating customers was secured. To accomplish this, it was necessary to sell about 20% more jobs, as there were still a number of removals or discontinuances during the year. Further accomplishments were the selling of 1758 automatic storage water heaters and numerous other equipment

in proportion. Altogether, these activities produced a gain of 12.4% in MCF sales for the year.

Thus at the beginning of 1936 considerable progress had been made and some momentum gained. Old man "Depression" had been buried and the morale of the organization was established. Still there was no mediocre job to do as the sights were set rather high, and the program outlined, very ambitious, the year's budget calling for an additional 887 househeating jobs, and 1700 storage water heaters.

There was much wagging of heads and the few usual "it can't be done's." Still all entered into the spirit whole-heartedly.

Briefly stated, the situation at this time was:

Total number of homes in Denver District	60,000
Total number of domestic househeating jobs	9,513
Percentage of homes heated	
Percentage of homes heated with gas	15.8
Percentage of homes occupied by owners	43

With 15% of the total homes already using gas heat, it was natural that a large number of those with good incomes had been secured. Therefore, much of the potentialities lay in the homes with moderate incomes. Statistics show that 42% of the families have an income of less than $2000.00, and a large percentage of these in turn are $1200.00 or under.

True, there was considerable building planned and in progress, and of course some business could be expected from the more fortunate class, but it was quite apparent that a large percentage of new business had to come from this 42%. Many of these homes were stove heated. So much thought was given as to the best means of securing this type of business on a permanent, satisfactory base. Circulating heaters had been tried extensively prior to the depression, with only partial success.

Families who had been content to heat their four or five room homes with a coal heater in the living room, and a combination range in the kitchen, were not satisfied with the same service from a gas heater. The latter with the same capacity as the replaced stove was inadequate, and one of sufficient capacity to heat the house either would not do so because of the inability to circulate the heat, or if this were possible, the circulation was too rapid, causing cold drafts on the floor. Again there was commonly the lack of chimneys for proper distribution of more than one heater.

During the year of 1935 considerable thought had been given this type of business and a limited number of floor furnaces had been installed. These jobs were given close attention in each specific case with the result that valuable experience was gained. The company then knew definitely what could be expected of this equipment and how to proceed to the best advantage.

Floor Furnaces For Zone Heating

This type of heating of course does not give the same service as a thermostatically controlled central heating plant, but for zone heating it was found that one or more of these floor furnaces, depending upon the situation, gave very satisfactory and economical results. These homes are usually operated on a very close budget, and with one or more units installed, the customer can curtail their operation to a minimum. Quite commonly, not more than one floor furnace is operated at any time, as the house is well closed off, while in extreme weather the heat is available if desired. Venting is simplified because flue pipes are run under the floors to proper outlets.

These units are now manufactured in a large range of types and capacities and thus offer an opportunity for splendid lay-offs.

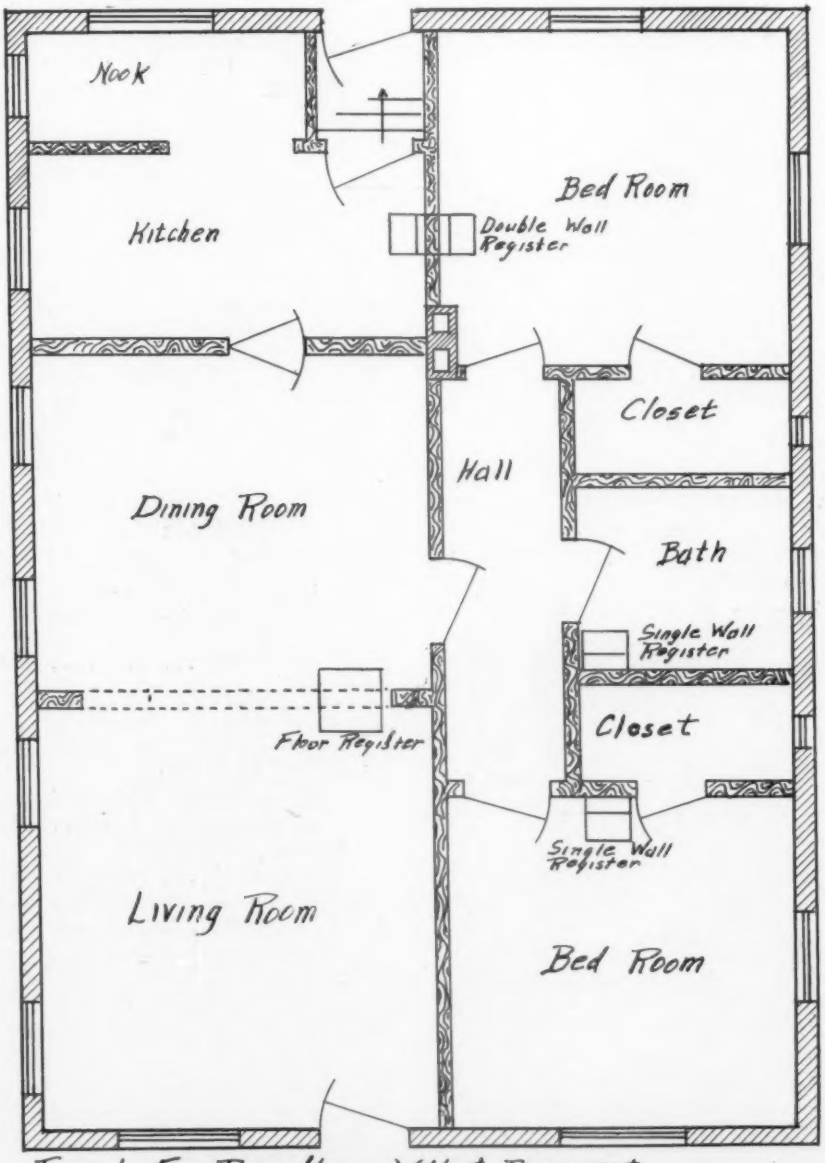
Thus, with proper application many gas heating problems are solved that cannot be handled satisfactorily otherwise. For instance, we have not only the stove-heated house with no basement, but the one with possibly quite a small one located too far in the rear of the house to permit the economical installation of a central heating plant. The same is true in heating the small stores and additions to houses where existing heating plant is inadequate or improperly located, as well as large rented rooms in residences where it is desired to give the tenant his own controlled source of heat. Also this type of equipment is very applicable in solving the ever present problem of heating the bath room.

Another application for the floor furnace and one that should be capitalized is for auxiliary heating where there is the usual combination dining and living rooms. Many customers who fear the high operating costs of gas heat for the few severe months of the year can be prevailed upon to install a floor furnace in the archway between those two rooms and to use it during the less severe heating periods.

This application is not only a very good revenue producer, but certainly permits the gas man to get "his foot in the door" on the heating job. In Denver there is a 40% saturation on the gas automatic storage water heaters which, together with gas ranges, consume to the first 3000 Cu. Ft. of gas per month. This consumption averages $1.25 per "MCF", while the next step in the rate is only $.52, thus making gas cost for auxiliary heating very reasonable.

In many instances the cost of additional excavating alone for a central heating plant will nearly pay for a floor furnace installation. This also applies to new construction of the small three and four room houses, for where the system is designed with the house, the installation can frequently be made on the money ordinarily spent for a basement.

However, as with the circulating type of heater, too much capacity must not be installed in one unit as it is far preferable to distribute the same amount of heat through more than one unit. Lack of this consideration can either make the job a success or a failure, and too much emphasis cannot be placed on this point.



Typical Five Room Home Without Basement Showing Suggested Floor Furnace Installation.

Suggested Application

The accompanying sketch shows a suggested application of these furnaces in the typical house without basement. This installation will not only heat the entire house if desired, but permits very economical operation due to its flexibility. It does not require much imagination to visualize a person of moderate income controlling his heating costs to meet the family budget with such a lay-out by closing off part of the house, operating individual units at a low demand, etc.

The cost of such an installation will just about equal that of a central heating plant, and all costs of excavating are saved.

Where the customer is not able to make the complete installation at one time, it is well to have such an ultimate plan in mind, and to add to the original installation from time to time until the job is complete. Such a program will avoid many pitfalls that might be encountered in a makeshift arrangement.

Realizing not only the possibilities with this type of heating, but the necessity of securing a large proportion of the increase in business from the lower income class, a very active campaign was carried out through the entire year of 1936.

Due to the anticipated volume of business, splendid co-operation was secured from the manufacturers. They allowed the company a special

campaign discount on all equipment purchased. This was passed on directly to the sales representatives in the form of a "cash on the barrel head" bonus for each unit as soon as the signed order was written up ready for execution. Quite naturally, this proved very stimulating to sales production.

Results for the year along this line were very gratifying and have proven that this type of business can be secured and maintained upon a very satisfactory basis, as the company was able to install 246 units during the year. This not only secured an entree into a new field, but helped very materially in making the annual budget for increased househeating jobs.

Yearly Results

Further very satisfactory results in building the househeating load were also attained through dealer cooperation. Through the past years of intensive selling, correct engineering and first class servicing, public acceptance was developed to an extent where a large percentage of the new homes built were designed to be heated with gas. This achievement, while well earned by conscientious past performance, still constituted a windfall, so to speak, and accounted for quite a nice number of jobs.

At all times the sales representatives were alert as to possibilities from previous users of gas heat who had for some reason or other been forced to discontinue. During the years of depression the company has always shown every possible consideration in such cases.

The result was that no bridges have been burned behind and even though some customers had to give up gas heating in the past, they appreciated its convenience and were in a receptive frame of mind towards reinstallation when their circumstances again permitted.

Each sales representative was kept advised at all times of such customers in his individual territory and he contacted them periodically, with considerable success. Thus another substantial source for ammunition with which to combat Mr. "Budget."

Sales Contests

At all times throughout the year various sales contests were in operation which kept up the enthusiasm of the organization.

Grand prizes, team prizes and individual prizes were always within the reach of each individual for term results, such as weekly, monthly and quarterly, while the "cash on the barrel head" policy was always in force. These special bonuses were made possible by close anticipation of future results and did not represent additional expense to the company, but simply meant the paying of a certain small percentage of the total commissions in this manner instead of all in one lump once each month. Such a system has always been a part of the compensation plan in Denver, and while it does entail a certain amount of extra bookkeeping, still it has at all times been very productive, for salesmen are just as human as any one else.

No intensive advertising was used, but a good liberal policy along this line was maintained. Neither were there any rental plans for househeating or water heating equipment. The trial basis plan was used only in a limited amount, and then for only reasonable period, and as a last resort in securing business. In such cases the job was closely scrutinized by the househeating engineers and had to merit favorable expectancies before the contract could be accepted.

As a whole, the class of business secured for the year of 1936 was very gratifying, as well designed central heating plants comprised a nice percentage of the total househeating jobs sold.

13% Increase

Thus what was considered almost an impossibility at the start of the year, not only became a possibility, but the budget was actually exceeded by a nice margin. A net gain of 960 househeating jobs was secured, together with the sale of 1641 storage water heaters which, with the same proportional sales of other gas equipment, produced a net increase of approximately 13% in the annual MCF sales.

Customer Writes Gas Ad. On Rates

"READ the following comparison between an old gas bill dated Feb. 1, 1861, and a gas bill of the present day, using the same number of cubic feet of gas, and you'll have little reason to complain of present gas rates," said Miss Heppie D. Andrews, 1807 Avenue F, Galveston, in her entry into the company's recent "write-ad" contest conducted for Galveston consumers.

Entitled "An Interesting Comparison," Miss Andrews' entry in the competition pointed out the difference in the cost of fuel in 1861 and the present time. Her figures show that in 1861 gas cost a domestic consumer $6 per 1,000 cubic feet, while in 1936 the domestic rate in Galveston is 85 cents per 1,000 cubic feet.

Miss Andrews' advertisement follows:

Read the following comparison between an old gas bill dated Feb. 1, 1861, and a gas bill of the present day using the same number of cubic feet of gas and you'll have little reason to complain of present gas rates.

Old Bill, 1861 (Original Company)

For gas consumed in month ending Jan. 31, 1861:

1,300 cubic feet consumed at $6 per 1,000	$7.80
Rent of meter	.25
Total	$8.05

Present Bill, 1936
(Present Company)

For gas consumed in month ending Sept. 15, 1936:

1,300 cubic feet consumed at 85 cents per 1,000	$1.11
Service charge at 75 cents per month	.75
Total	$1.86

Quite a difference in figures and dates you'll say! but there is even a greater change since that date and the present in gas equipment and appliances. Visit the gas company and see for yourself that the new gas ranges, heaters, etc., are marvels of convenience and beauty.

Blue Blaze News,
Lone Star Gas System,
Dallas, Tex.

Legal Effect of Public Utility Commission's Decisions

By Leo T. Parker

Attorney at Law
Cincinnati, Ohio

CONSIDERABLE discussion has arisen from time to time as to legal rights of Public Service or Utility Commissions and whether, and under what circumstances, a gas company may be subjected to control of a Public Service or Utility Commission in the sale and distribution of gas.

First, it is important to know that when determining whether a gas company is a Public Service Company, the test to be applied is whether or not it held itself out, expressly or impliedly, as being engaged in the business of supplying gas to the public, *not necessarily to all of the public,* but to any limited portion of it. A company is not subject to Public Utilities Commission's control if it holds itself out as serving or ready to serve *only* particular individuals, either as a matter of accommodation or for other reasons peculiar and particular to them.

Obviously, it may be conceded that almost all companies selling gas actually are in the classification of Public Utilities or a Public Service Company.

Exclusive Franchise Necessary

Another important point of the law is that a gas company cannot restrain a municipality from establishing its own gas system, where it is shown that the gas company has *no* exclusive franchise and the gas rates are not controlled by a state body, as a Public Utilities Commission. So held a higher court in the late case of Westchester Joint v. Village of Pelham, 265 N. Y. S. 491.

The facts of this case are that a municipality intended to construct a gas system and install mains in competition to a Public Utility Company. Since the municipality had not in the past granted an exclusive franchise to supply the community, the court held that the city could *not* by legal procedure be prevented from installing its own system, and said:

"The plaintiff (company) does not possess an exclusive franchise. Its rates are not under the jurisdiction and control of any state body, and the fact that the village may parallel its lines gives it no right to restrain such action."

Police Power

The right of the state to regulate the rates and practices of a Public Utility is referable to the "police power" of the state. It is a legislative function which cannot be alienated or contracted away by the state or any agency or political subdivision of the state. The Constitution and laws of a state are a part and parcel of the terms of a gas franchise.

Therefore, a state may in the exercise of its police power change franchise or contract rates in the protection of the inalienable rights and general welfare of its citizens. In other words, although a contract exists in which gas rates are established, if such rates are unreasonable a state may through its police power alter such rates. (See Munn v. Illinois, 94 U. S. 113, 24 L. Ed. 77; Milwaukee Co. v. Com., 153 Wis. 592, 238 U. S. 174, 59 L. Ed. 1254.)

On the other hand, this rule of the law must not be confused with the opposite rule relating to city ordinances or contracts which fix rates *for a limited period of time.* (Southern Iowa Electric Company v. Chariton, 255 U. S. 539.) Ordinances and contracts of this nature are valid and, in the absence of fraud in establishing the rates, it is quite impossible to change or alter the rates thus agreed upon.

With respect to gas rates established by Public Utility Commissions and Public Service Commissions, the law is well settled that such rates are presumed to be valid, reasonable, and just until declared otherwise by a court of competent jurisdiction. In order to overcome this presumption in favor of the validity of the rate the burden of proof rests heavily upon the complaining party. (292 U. S. 290.)

The latest higher court case involving this point of the law is State v. Lone Star Gas Company, 86 S. W. (2d) 484. In this case a Public Utility Commission, after careful consideration, established gas rates. The company explained the law saying:

"Rate making is essentially a legislative function, and operates prospectively. . . . Rate making has been delegated to the Commission alone, and its acts in that regard have the force and effect of statutes."

Another recent and leading higher court case on this subject is United Gas Public Service Company v. State, 89 S. W. (2d) 1094. The facts of this case are that in 1909 a city granted certain individuals a 25-year franchise to construct and operate a natural gas distribution system in the city. From the year 1921 to 1931, the natural gas rate for domestic use was 75 cents per M. C. F., with 10 per cent discount if bill was paid within 10 days from date, and with a minimum monthly bill of $1 per customer. In 1931, the city acting under the authority of a state law, passed an ordinance and fixed the natural gas rate for domestic use at 40 cents per M. C. F., with 10 per cent discount if bill was paid in 10 days. An appeal was perfected from the ordinance to the Public Utility Commission.

After due consideration the Commission promulgated its order fixing the natural gas rate for domestic use at 55 cents per M. C. F., with minimum monthly bill of $1 per customer.

The gas company immediately filed suit to restrain the city from enforcing the new rates and contended that the law was unreasonable. However, since the gas company did not prove that the new rates actually were unreasonable, the higher court upheld the rates established by the Public Utility Commission, saying:

"Suffice it to say here: That rate making is essentially a legislative function. That rates fixed by the Commission have the same force and effect of statutes, and are subject to court review to the extent only as statutes of the same import are so subject, with the additional statutory authority of the court to determine whether the rate is unjust and unreasonable, and the inherent power of the court to determine the constitutional question of confiscation. . . . The rate fixed by the commission is presumed to be valid, reasonable, and just until declared otherwise by a court of competent jurisdiction."

Free to Contract

On the other hand, it has been held that where the gas rate fixed by a Public Utility Commission is declared void then the city and the gas company are free to agree upon rates to be charged and no consent of the court or Commission is necessary.

For illustration, in the late case of Central Kentucky Natural Gas Company v. City of Lexingtion, 85 S. W. (2d) 870, it was disclosed that the old franchise of a gas company expired. No new franchise was offered for sale by the city, and the gas company gave notice that service would be discontinued upon the expiration of the then existing franchise contract. Thereupon the city obtained an injunction requiring the continuance of service pending further negotiations for the sale of a new franchise. Soon afterwards a new franchise was agreed on and purchased by the gas company. The new franchise did not fix the rates to be charged other than that they should be reasonable. It provided, however, that if the rates promulgated by the gas company were deemed excessive, the city might appeal to the Public Utilities Commission. The city did appeal to the Commission, and, after lengthy hearings, a rate was fixed by the Commission. The gas company filed suit to invalidate the Commission's rates on the grounds that the rates were insufficient to net a reasonable return on the company's investment. The court directed the Commission to fix a rate yielding a more reasonable return to the gas company. In the meantime the city and the gas company undertook to compromise their differences (1) by agreeing upon a rate for the future, and (2) by providing for a distribution of the impounded funds. The terms of the agreement were embodied in a city ordinance accepted by the gas company. The Board of Commissioners passed Ordinance 271, amending the existing franchise ordinance and putting into effect the agreed new schedule of rates for the future. It was erroneously thought by numerous voters that Ordinance 271 was subject to a referendum (Union Light, Heat & Power Company v. City of Covington, 246 Ky. 663, 55 S. W. (2d) 667), and a petition for a referendum was filed against it. Thereupon the Board of Commissioners repealed both ordinances, and another ordinance was enacted. Subsequently legal controversy arose over the validity of the rates established by the ordinance, it being contended by certain citizens that the rates were excessive. Thereupon the city officials repealed the ordinance. Complaining of this, the gas company filed suit against the city but later the gas company and the city signed a contract which contained a new schedule of reasonable rates. Notwithstanding the fact that certain citizens argued that the Public Utility Commission should fix rates, the higher court held the agreement between the gas company and the municipality, and the ordinance, valid, saying:

"The rate fixed by the Commission was a nullity. . . . The city and gas company, therefore, were as free to agree upon the rates to be charged under the franchise contract as they were before the void finding of the Commission was promulgated. . . . The city and the gas company certainly had the power to deal with the situation in a practical way, and so long as the result of their action was to agree upon a return for the gas company that was neither extortionate nor confiscatory, we can see no reason for objection to the method adopted."

Expenses of Public Service Commission Investigation

Various courts have held that state laws are valid which provide that whenever a Public Service Commission shall deem it necessary to investigate the operations, service, practices, accounting records, rates, charges, rules and regulations, or to make valuations or revaluations of the property of a gas company, such company shall be charged with and pay such portion of the compensation and expenses of the commission, its officers, agents and employes, including employes temporarily employed, as is reasonably attributable to such investigation, valuation or revaluation.

This law was upheld in the recent case of Bronx Gas Company v. Maltbie, 197 N. E. 281. The facts of this case are that a Public Service Commission investigated a gas company's expenses of operation, investments, etc. The legal question arose as to whether such expenses should be charged directly to the gas company or to the general state expenses. This court held that the Public Service Commission has the power to make investigation and to fix the rates to be charged. Also, the court held that the determination of whether an investigation into rates should be made rests *solely* in the discretion of the Public Service Commission and that the courts may not interfere, but that the costs shall be borne by the company being investigated in view of a state law to this effect. This court said:

"The question concerns the power of the Legislature to place the costs and expenses of hearings and examinations upon the company. That this power exists there seems to be no doubt."

Commission Must Act Jointly

The law is well established that state, county or city commissioners cannot make valid agreements, unless all of the commissioners act collectively and *as a board*. Moreover, all acts must be authorized by state laws.

For example, in Amity v. Eden, 265 N. Y. S. 23, it was disclosed that a company, engaged in a land development operation, laid mains in this private development to supply gas to houses constructed. It did so in accordance with plans and specifications that conformed to those required by the commissioners.

Later the company filed suit to collect from the city the cost of the installation, amounting to $11,161, contending that two of the three commissioners had verbally agreed, before the installation, that the city would pay for the improvements. In refusing to order the city to pay for the installation, the court said:

"The defendants (commissioners) are a statutory board. They have no powers other than those given to them by statute. The powers conferred on them as a board may not be exercised except as a board. . . . A further barrier, however, exists in the statutes . . . that power could only be exercised in a manner that enabled the electors to have a voice in it."

Commission Has Jurisdiction

Generally speaking, the courts will not render a favorable decision on a suit against a gas company by a competitive company, if a state law gives exclusive jurisdiction to the Public Utilities Commission to decide the controversy.

For instance, in Wright v. Lancaster Company, 167 Atl. 397, it was shown that a state law authorized a Public Service Commission to supervise the operation, disagreements, etc., involving Public Utility Companies. Notwithstanding this law a citizen filed suit involving a disagreement on a pipe connection, and asked the court to decide the controversy.

(Continued on page 60)

A Sales Control System for Outside Salesmen

That Keeps Sales in High

by

Fred Merish

EXTENSIVE field investigation has shown that outside salesmen make more sales for the dealer who uses an efficient sales control system. Great strides have been made in perfecting the "mechanics" of sales control whereby the dealer can get at the why's, what's and when's of each and every outside sales transaction, from the time the prospect originates until the sale is closed. Sales control of a store salesman is a simple matter compared to sales control of an outside salesman because the dealer has the store man always within eye focus. The outside salesman, beyond eye range, must be checked with a sales control system.

There are sales control systems on the market that may be purchased reasonably or the dealer may construct his own system and get satisfactory results, if he follows the fundamentals. A large number of the sales control systems used by retailers are not sufficiently effective to bring maximum returns. Most of these systems are merely prospect cards, about 4 by 6, address and phone number at the top, and lines underneath to write in comments touching interviews. This method of recording sales data is as old-fashioned as the hoop skirt. Such sales control systems are better than none but they lack many qualifications necessary to competent supervision of salesmen. An efficient sales control system should tell a complete story at all times and should function with mechanical precision. The "garden variety" type of sales report is a long way from a well-devised sales control system.

After analyzing many sales control systems and discussing them with retailers experienced with outside sales work, we find that the system most adaptable to retailers of gas appliances, contains 5 forms. As described and illustrated here, this sales control system gives maximum information with minimum clerical effort, also provides easy compilation of statistical data for sales analysis.

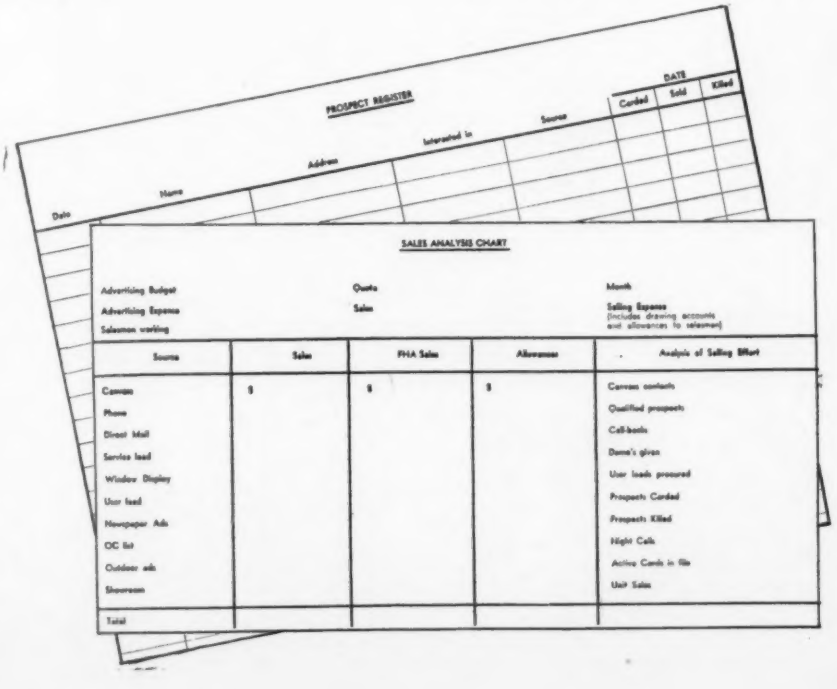
The 5 forms are:

1—Prospect Register
2—Prospect Card
3—Customer Card
4—Daily Sales Report
5—Sales Analysis Chart

The Prospect Register is the genesis of the system, all genuine prospects being listed thereon. This prevents loss of good leads and provides centralized control from which the sales manager or dealer can make a periodical check on the success his salesmen are having with live leads. The Prospect Register also supplies valuable statistical information for the Sales Analysis Chart, the finis of the system.

The Prospect Card in a modern system of sales control differs from the old style form in that it is filed according to the follow-up date, and comes up for action automatically when the call-back is due. Tickler file arrangement. The name of the prospect is secondary. This assures prompt follow-up and no oversights. With competition keen, it is essential that salesmen time their call-backs intelligently and make them promptly, otherwise, competitors may filch the business. The modernized Prospect Card also provides for limited credit information to guide the salesman or dealer in determining whether the prospect warrants strenuous follow-up. Other information necessary to the compilation of statistics for the Sales Analysis Chart is placed upon the Prospect Card.

The Customer Card is an example of the evolution that has taken place in the sales control system. A customer file is exploited as energetically as a prospect file. This prevents



PROSPECT CARD
(Card for each unit)

Follow-up Date		Hour
Interested in	Quoted	Source
Name	Address	Phone
Occupation	Number in Family	How many working?
Type Home	Own or Rent	Old Customer
Trade-in allowance demanded		Offered
Competition or prejudices		
Excuse for not closing		
Sale closed	Amount $	Cash down $

NC ☐ **CUSTOMER CARD** OC ☐

Name	Address	Phone
Units	Date Sold	Salesman
Financed through	Date	Pays out When

TRANSCRIPT OF SALE

Selling price	
Less trade-in allowance	
Net selling price	
Installation fee	
Accessories	
Finance charge	
TOTAL	

Date delivery or installation

What is customer likely to buy next ? When ?

salesmen from forgetting old customers as too many salesmen do. Old customers of good credit standing are first-line prospects for other products sold. Old customers are also an excellent source of user leads providing old customers are contacted periodically. The Customer Card guards against forgetting old customers. It is filed alphabetically or by date, if the salesman can qualify the customer regarding the next probable purchase and date, in which event, the card is filed to come up for action at that time. The Transcript of Sale is recorded for ready reference in case of misunderstanding regarding settlement and to give the salesman, when following up the customer for plus business, an idea of the grade merchandise purchased before and the size of the trade-in allowance. By referring to the Customer Card the salesman can tell when going after a repeat sale or a plus sale from the same customer, whether he will be satisfied with a small trade-in allowance or demands the limit, whether he pays on the dot or is slow pay, whether he finances long term or short term, etc. The Customer Card also carries valuable information for the statistical build-up of the Sales Analysis Chart.

The Daily Sales Report in the modern sales control system offers another improvement over the old-fashioned sales report in that it provides an automatic accumulative total of each salesman's work to date, which enables the dealer to keep close track of his outside salesmen without going over a mass of records. Interviews, results of interviews, call-back dates and other pertinent information is recorded—a precise picture of the day's selling activities in figures and facts for current consumption, also used later in a statistical way on the Sales Analysis Chart.

The Sales Analysis Chart provides monthly sales statistics to guide the dealer from every angle, including territorial sales analysis. If salesmen are making too few sales to calls, presumably because they are rushing interviews or are weak closers, if selling and advertising expense are too high for sales volume, if window displays have dried up as a source of sales, if too few demonstrations are given in proportion to qualified prospects, the Sales Analysis Chart discloses these facts and others so that the necessary adjustments may be made.

The forms of a well-devised sales control system fit together like a jig-saw puzzle to produce a perfect picture of selling effort vs. selling results vs. selling possibilities. Forms may be printed, mimeographed, multigraphed or typewritten in carbon. Prospect Cards and Customer Cards are most adaptable in sizes 4 by 6 or 5 by 7 for filing in cabinets. The Prospect Register, Daily Sales Report and Sales Analysis Chart are usually kept in loose leaf binders.

Forms shown are merely guides to the construction of a sales control system and should be adjusted to fit the dealer's requirements on outside sales work, yet, retaining the fundamentals. Remember that it is always dangerous to try to fit a business to a system. Always fit a system to a business.

Daily Report

INTERVIEWS SECURED TODAY — NAME	ADDRESS	SOURCE	RESULT OF INTERVIEW — Model Sold - Recall Date - Comments - Competitors Prospect For - Etc.	Not Possible	Interview	Demonstrations			Qualified Prospect
USERS			(Prospects Received)						
Total for today			Sales / T. Ins / User Calls / Courtesy Contacts						
Total from previous report									
Total activity for period to date									

Date Salesman Checked By Supervisor or Dealer

Talking Slide-Film Promotes Gas

Consolidated Edison Company of New York has recently released a half-hour AudiVision talking slide-film entitled, 'That's What You Think," which dramatizes factual information about the comparative costs of gas and other fuels for house heating, to acquaint their employees and the public with the merits, economy, and general advantages of gas heating.

The production was first shown to Consolidated Edison employees and later released for showing to clubs, business groups, home owners, and the general public at specially arranged meetings. "That's What You Think" is a dramatic skit, clothing the gas story in action scenes, humorous situations, and marital squabbles. Officials report enthusiastic responses to first showings and are making plans to speed up distribution with additional projection equipment.

"What's Ahead in Sales"

By R. J. Rutherford

V. P. Worcester Gas Light Co.,
Worcester, Mass.

OUT in Missouri a farmer lost a mule. He looked in every available place and after a very thorough search, still no mule. In desperation he consulted the half-witted hired man. The half-wit stood wondering for a moment and then walked rapidly away and in about five minutes he came back with the lost mule. The farmer, highly interested in the results, inquired of the half-wit how he had accomplished this. He replied, "Well, I just stood and figured 'Now, if I was a mule, where would I go?' so I went there and sure enough, there he was."

Now, by placing myself in the role of the half-wit hired man I have attempted to stand and wonder where the "jack asses" are going in sales. Your Committee has requested me to speak on the subject of "What's Ahead in Sales."

What I have got to say is not necessarily what I believe, but rather an attempt to review some of the general thinking that is taking place on the subject of house heating in manufactured gas areas. Perhaps the greatest indictment that can be made against our industry is that it lacks original thinking. The best example or illustration of this point is by comparison with the electric industry. They are primarily innovators. Almost every month there is some new gadget to glorify and dramatize electricity. We, on the other hand, are almost in the class of imitators. This comparison also exists in the field of merchandising. How many gas men in the new business field are offensive merchandisers? Isn't it true that the majority of us wait until the electric or oil advertising breaks, then we scurry around and refute this move. Oil burner prices go to $150, no down payment, three years to pay. We immediately bring pressure to bear to obtain these same prices and terms, and yet the public, ourselves and our competitors know that we

R. J. Rutherford

have the best product. Unfortunately the day of making the best mouse trap and having the world beat a path to our door is gone. We are now in the era where success comes to those who can make the best claptrap.

Noel Coward is credited with the statement that coleslaw has reached the zenith in popular acceptance, not because it is a good food and a healthy food, but because it is judiciously dramatized cabbage. Merit is a necessary attribute but no longer alone guarantees popular acceptance.

Present Story in New Way

It would seem that with the inherent advantages our fuel possesses there is some new way, a more effective way, of presenting our story. For example, the generally accepted method of presenting house heating service to the customer is to match crude fuel costs with a lot of trick figures which the customer either accepts with reluctance or refuses to concede at all. In either event we haven't simplified our selling task and the earnest and honest array of figures which we present many times becomes a formidable barrier which we fail to hurdle.

When we focus the attention to cost and cost alone may we not be in error? Incidental costs of other fuels certainly should be presented, but why make them the only issue?

Naturally, this immediately places us on a direct competitive basis with oil. Everything we offer, he offers. It affords an opportunity for the oil man to sell by direct comparison, the cost of equipment, the type of the equipment, the type of controls, the cost of the fuel, etc. *We* are in *his* "back yard." This, in spite of the fact that the oil man in the home can provide only one generally accepted service, that of heating. To a small extent he can offer water heating, but beyond these two it is necessary for the customer to look elsewhere to supply the balance of the necessary services.

We, on the other hand, can offer a complete carefree solution to the four major problems of modern home running—heating, water heating, refrigeration and cooking. Further, we are the only agency offering this complete service to the American home. Electric, oil or coal all lack one or more. Why not offer a package containing the four appliances with appropriate rates and finance terms to fit? One Utility now does this, and for an average six-room home offers to supply a modern gas refrigerator, a modern gas range, modern gas automatic water heating and modern gas heating equipment, all for a budget payment, including both the cost of equipment and operation, averaging $30.00 per month.

This plan has practical value, because apparently there is a definite correlation between the interest in a change in the heating system with the obsolescence of the equipment providing the other services. Usually, the average American family is prone to take on new heating, for example, unless they are pretty well cleaned up in the payment of other

* *Presented before the House Heating Conference—A.G.A., Hotel Gov. Clinton, New York, December 16, 1936.*

devices. Today with the fancy terms offered on most equipment, by the time it is paid for, it is worn out.

This approach may offer suggestions for other lines of thought. Perhaps some of you heard one of the speakers at the Fall Convention make a statement that he was very tired of hearing the remark made that the gas industry is asleep. He went on to say that in his opinion the industry is not asleep but rather wide awake, the only difficulty being that we haven't got out of bed yet. Modern psychiatrists tell us that the prone position is most conducive to thought; who knows, maybe we're just thinking.

Sales Organization

Another opportunity may be in the sales organization set-up found in most gas companies. The House Heating Department usually consists of a unit or units comprising three salesmen to an engineer. Very little consideration is given to the services of the company as a whole other than space heating. In many companies the domestic organization is sub-divided between water heating specialists and others. Now, inasmuch as the installation of an oil burner usually affects the water heating load, particularly in territories with a high saturation of steam systems, might it not be conceivable to change this set-up so that house heating includes water heating? This might lead us to a study of water heating sales and house heating sales in our own companies. While the following figures may not apply directly to your property, they are generally true in New England. We do have an exceedingly high saturation of steam systems which are particularly adapted to indirect heaters and aquastats. On every oil job that goes in this is standard equipment. Supposing, under the present set-up a company of, say, 30,000 meters sells 100 house heating jobs and 300 automatic water heaters amounting to approximately 40 million cubic feet added annually. Of the 300 automatics sold at least 50 of these were due to the sale of a house heating job. Further, suppose the water heating specialists expense was put into house heating effort resulting in the sale of 160 house heating jobs, each including an automatic water heater, the added load would be much greater in total for the same expenditure of money.

This conjecture leads to thoughts concerning rates. It is hard to believe in very many situations that the house heating market presented as a result of any given rate has been entirely saturated. Certainly this statement will become increasingly truer as the purchasing power increases with better business. Further, in manufacturing territory, it is practically impossible to lower rates sufficiently to be wholly competitive in a mass market. From an earnings standpoint the loss on rate reductions is permanent, somewhat like taxes and death, whereas a change in the sales set-up such as increased personnel, advertising, promotion, terms, prices, etc., is of a temporary nature and can be pared down on short notice. That this latter method will work has been practically demonstrated in New England where two companies took the two different methods mentioned, one a drastic rate reduction, the other doubling its sales force and advertising. From the figures now available it would appear that the second method is far more preferable. The net revenue increases, after reductions and new business expense, favor the increased man power plan.

Song of a Housewife

Oh, list to the happy housewife sing
About her daily tasks
And pass along this goodly thing
To every one who asks.

"My morning toilet now is fun
No freezing cold ablution
But piping hot the spigots run
Gas heat is my solution."

"My meals are ready on the dot
No slow poke fuels for me
Nor must I linger on the spot
Controls have set me free."

"My food supply is kept so nice
I never say, 'Oh Shucks'
I don't depend on melting ice
But on—Electrolux."

"When chill November ushers in
Old Winter—'Autocrat'
I greet him with a cheery grin
And set my thermostat."

"For services so widely flung
That bring these things to pass
Would that I had a poet's tongue
To sing the 'Song of Gas.'"

N. M. Sedenger.
Philadelphia Gas Works News

Another angle that a few gas companies have taken is that of market analysis which would permit their sales effort, including man power and advertising, to be more effective, and consequently much cheaper per dollar revenue added.

Different Approach

Certainly there is a better approach to the market than the haphazard manner in which most of us operate. The proper approach to a problem many times of itself offers the solution. Take the case of Will Rogers the last time he was in England wanting to see the King. He went to the palace and was stopped by some very high hat guards. He said "I am Will Rogers and I want to see the King. Tell him when the Prince of Wales was over in our country he told me to look up his 'old man' sometime, and here I am." The guards were so astounded that he was permitted to enter and eventually invited to lunch—proving the advocacy of an original, different and effective approach.

Advertising media for house heating in any manufactured gas company is certainly a problem in itself. Which is the most effective with a limited appropriation, for example, newspaper, direct mail, radio, billboards, etc.? There is an old German proverb which states "Lovers and poets are privileged to lie." I have never seen a poetic oil advertisement so that it seems safe to assume that there must be some great lovers in that business. Maybe this is what we need. Certainly, if we can't provide rates commensurate with the public idea, then we have got to raise the public idea commensurate with the rates and service we can render.

The past six years have unquestionably been trying ones for gas heating, but nothing can change the fact that we still possess the ideal fuel and service. The country is undoubtedly on the road to recovery again, the road to previous prosperity. Only the other day I noticed that they are again offering prizes for poetry, a sure sign of returning good times.

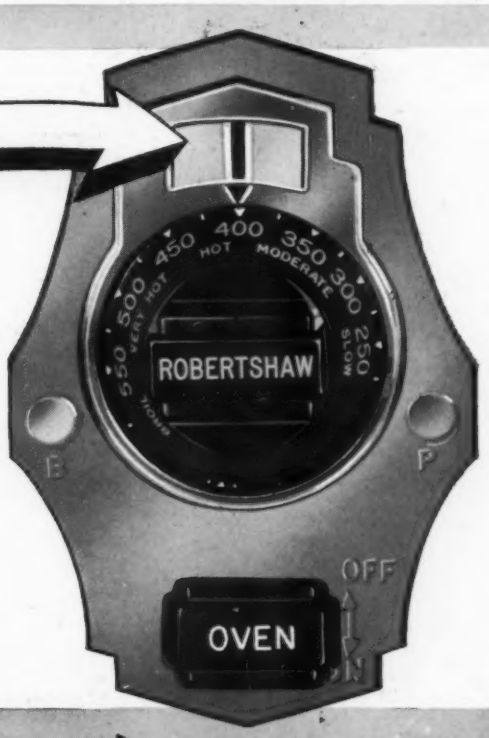
Let's forget the past and look at the future. One of the best tests for memory is trying to recall what we were worrying about last week. "What's ahead in Sales?" Maybe it depends on your liver, but don't sell the gas industry short, and let's make our 1937 slogan "An Unpaid Balance in Every Home!"

For Gas Ranges!

to the famous Robertshaw oven-heat-control has been added Thermal Eye

Sight!

When the oven reaches the temperature set by the dial a RED SIGNAL comes into view—showing the user that the oven is ready for use!



Action!

Selling action! That's what the Robertshaw Thermal Eye supplies. It catches the eyes of prospects. It increases their interest in your gas range. It gives the salesman something he can talk about—and dramatize!

Thermal Eye stands as the biggest thing that's ever happened in oven-heat control. Its selling influence is important to you. Write Robertshaw for Thermal Eye folder.

FRONT-OF-RANGE ADJUSTMENT—An improvement that saves service hours! Oven by-pass and safety pilot are easily adjusted with a screw driver (at points B and P in illustration above).

ROBERTSHAW THERMOSTAT COMPANY, Youngwood, Pa.

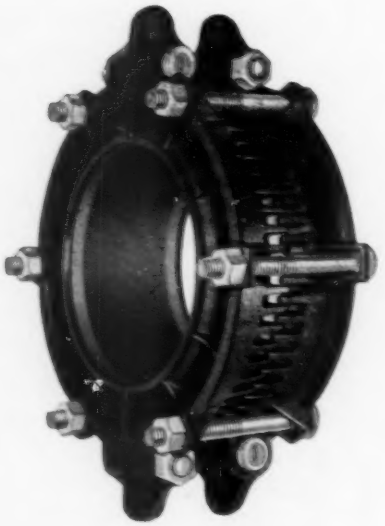
Over 2,700,000 Robertshaw controls are in use

QUICK, PERMANENT REPAIR FOR BROKEN MAINS

SKINNER SPLIT COUPLING CLAMPS can be installed easily and without shutdown by ONE MAN in from 12 to 20 minutes—a great time saving when compared with old-fashioned cast iron split sleeves, which usually take two or three men 3 or 4 hours to apply.

And these Clamps are permanent—for pressures up to 600 lbs., with ample excess strength guaranteed. Clamp is of malleable iron, heavily enamelled; sturdy steel bolts are cadmium plated; soft gum and carbon black gasket is SEALED by Monel metal seal band, under tremendous pressure. Stops the original leak. Provides a degree of flexibility which prevents future breaks at the same point. Thousands used yearly on both gas and water mains.

Get ready now for the trouble that's sure to come when sub-zero weather arrives. Order Skinner Split Coupling Clamps for each size of main—then see for yourself the savings in time and money.



GET COMPLETE CATALOG

M. B. SKINNER CO. *Est. 1898* **SOUTH BEND, IND.**

Pipe Corrosion and Coatings

Soil Surveying

Part 7

By Erick Larson

WITH a thorough knowledge of the fundamental theories, the success of electrical soil corrosion surveying requires only the addition of the confidence to be secured through experience. However, the time required to secure such confidence is minimized by a perusal of the experiences of others when conveniently available. The material here presented is purposely condensed so as to add to convenience the advantage of brevity.

The actual determination of the relevant electrical properties of the soil may be conducted in the laboratory or the field. Neither may be said to surpass the other in the accuracy with which the need for protection may be predicted when such forecast is based only on a single electrical resistance measurement. However, conducting the determinations in the laboratory offers a vastly greater opportunity to extend the examination, and to determine the effect on soil resistance and corrosion of changes in the various factors causing corrosion.

Resistance Rods

The most common method employed in soil surveying and also the simplest of all procedures is the use of so called "Resistance Rods." The rods are of two general types one of which has two electrodes, electrically connected above the surface of the ground and using the soil into which the two electrodes are imbedded to complete the circuit. An electrical potential is impressed on one of the terminals and the resistance through the soils measured directly or computed. The second general classification is a rod built upon the principle of the galvanic cell with two dissimilar metals electrically connected through a measuring instrument, the soil acting as the electrolyte and the current flow measured and translated into resistance if desired.

The most common method of soil surveying being the resistance rod, more complete description of that process is warranted. An external source of energy is used to impose a more or less constant low voltage upon the anodic pole of the apparatus. The resulting flow of current, if any, between the two poles, is measured by a sensitive instrument. The measuring device or meter is usually mounted upon one of the cane electrodes to facilitate readings being taken by one operator. The meter is ordinarily calibrated in ohm centimeters.

Care is necessary to secure soil resistivities of value and therefore experienced observers are essential to secure results which may be generally applied. Even when the observations are made by experienced surveyors, the resistivities secured are ordinarily not assumed as accurate in the engineering sense of the term, but those made by the same observer are relative, and may be compared with others by the same surveyors and frequently with those of foreign surveyors. This fact does not detract from the value of observations however, as the wide limits of the resistivities found in ordinary soils and the two or three classes into which they are divided, results in relatively high percentage of error having but small effect, and will not alter nor decrease the accuracy of the decision of providing protection or not. The lack of necessity for a high degree of scientific accuracy has already been mentioned in discussing the numerical values of resistivity assigned to soils which may be designated as highly, mildly and non-corrosive. The lack of necessity for securing an engineering accuracy, indicates the extreme inaccuracy which may occur when inexperienced operators conduct the field work.

Shepard Rods

During research on soil corrosion the corrosion division of the National Bureau of Standards developed the so called "Shepard Rod," named after E. R. Shepard, for determining the resistivity of soil. The usual apparatus consists of two rods or canes constructed of steel or brass, the majority of the surface being coated with a bakelite, or similar substance which is resistant to physical damage and is also an electrical insulator. Manufacturing these canes of iron in place of brass is usually considered preferable, as the iron rods are less affected by polarization. The electrical circuit is from a battery through a conductor to the measuring instrument, through one rod to the soil, through the soil to the second rod, thence by conductor to the battery. A switch is located at some convenient point on the rod.

One of the difficulties encountered in the design of any resistance rod, is to minimize the effect of polarization. This is accomplished in the Shepard Rod by making the area of the cathode large compared with the anode. As a still further precaution against the effects of polarization and other factors, the instantaneous magnitude of the current flow immediately following closing of the circuit, is taken as the criteria of the corrosiveness. The greater the magnitude of the current flow, or the less the resistance, the more intense corrosion is apt to be.

The desired current reading is secured by closing the circuit switch as soon after insertion of the rod

into the soil as possible, and immediately taking the reading. An additional advantage of this meter reading immediately following insertion of the rod, is that the contact between rod and soil is electrically superior before the soil pressure has been released. The soil pressure on the rod immediately following insertion is gradually but rather quickly relieved. A voltage of three volts is imposed upon the anode of a Shepard Rod.

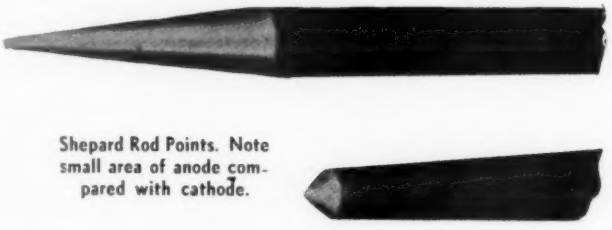
Field Procedure

The rods are inserted into the earth approximately a foot or more apart. While the majority of Shepard Rods are in two parts, for very deep surveying both electrodes may be mounted on a single rod. A disadvantage of this type of mounting is that the two poles may be in entirely different soil stratas, with the possibility of rather large errors in the interpretation of observed resistances. Other disadvantages of single rods will be discussed later.

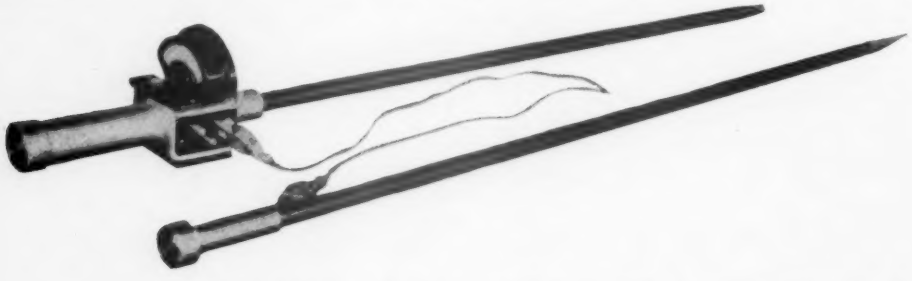
The usual field procedure is to use electrical or pneumatic equipment for drilling through improved paving. Especially where concrete exists, the drill will penetrate to a slightly greater depth than the paving thickness, and dust together with small pieces of concrete will remain in the path of the rod and be forced deeper into the soil as the rod penetrates, acting as a partial or even complete lining of the hole. When the drilling is accomplished with pneumatic equipment, it is desirable to use a blast of air to clean excessive dust and pieces of concrete out of the drilled hole. The preferable type of equipment to use is a type of drill which pulverizes the concrete and automatically clears the hole of dust. The reason for this cleaning is that the dry dust, even when only partially lining a hole, may provide a high degree of resistance to current flow, may cause a slight dehydration of the soil, which is undesirable, and any larger particles may completely separate and thus insulate the rod from the surrounding soil. When wet the concrete dust is a good conductor and would result in low resistance values.

Following the drilling operation, the hole is deepened by means of driving a regular driving rod, or by using an earth auger, either of which need only be slightly larger in diameter than the resistance rod. The advantage of using an earth auger is that samples of the soil may be collected or at least observed, and description noted in the survey notes. Observation of the relative moisture content of the soil is of considerable importance when interpreting the resistance readings. While a mere observation can only indicate whether a soil is moist or dry, and any percentage estimate may lead to considerable error in interpretation, an experienced surveyor can judge whether the soil is at or near the saturation point, which was previously described as producing an indication of maximum corrosiveness. A more precise and satisfactory procedure is to take the soil samples into the laboratory and make an exact determination of moisture content.

Observation of the soil characteristics when drilling with an earth auger should be made at not greater than one foot vertical intervals. If a change in strata is noted, a more exact determination of the elevation of the top and bottom of the strata should be made by lessening the intervals. The resistivities of the various strata both above, and for a short distance beneath the pipe, may vary from that at pipe level, and are usually determined. After drilling a hole, the soil pressure against the rod up to the drilled depth would not be sufficient to provide the desired contact, and therefore when additional resistivity readings are desired at such elevations, tamping may be resorted to, but are preferably taken in adjacent but unaugered locations, or at the next following point of determination. The importance of the corrosiveness of other strata is that they may contain corrosive materials easily absorbed by adjacent layers either above or below. For this reason, the maximum corrosiveness as indicated by the minimum resistance in any of the strata surveyed, is taken to represent that at pipe level. The soil in the strata of maximum corrosiveness may become mixed with other strata during excavation or backfill, and in highly localized areas be in direct contact with the pipe. The necessity for making a resistivity reading at any other than pipe level, is usually determined from the observation of one or more soil types other than that at pipe level.



Shepard Rod Points. Note small area of anode compared with cathode.



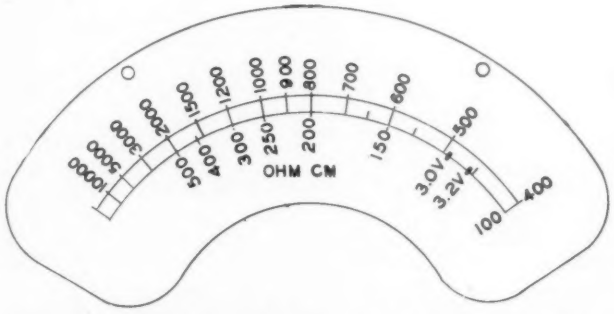
Shepard Earth Conductivity Survey Rod.

The auger or driving rod used to secure an enlarged hole for insertion of the survey rod is only used to within six inches of the proposed reading elevation or pipe depth, so as to avoid any disturbing of the soil at that depth previous to the reading being taken. When approaching, at or just beneath pipe depth, it is desirable to take readings at shorter vertical intervals than above that elevation. This final series of progressive readings are for the primary purpose of determining the actual resistance of the soil at or near pipe depths. A single reading may be affected by higher resistant soils carried into lower strata when driving the survey rod, by a highly localized presence of rock or pieces of gravel, or by poor contact between rod and soil immediately following the driving of the rod itself. After practice in the pushing or driving of rods, par-

ticular obstructions such as stone or individual pieces of gravel which would interfere with the accuracy of readings, may be determined by the feel of the rod. Confirmation of a suspicion from the feel of the rod that such obstructions exist, may frequently be secured by noting the difference in readings. For instance, in the following four readings taken progressively; only a matter of a few inches apart, number one, three and four represent the actual condition of the soil, while number two indicates the presence of a high resistance obstruction, and therefore would be discarded in the final selection of resistance readings.

Relative Elevation	*Ohm-centimeters*
1	1,500
2	6,000
3	1,400
4	1,400

When consistently high resistances are obtained, interchanging of rods in the test holes may be valuable in avoiding missing lower values. Even though the readings appear to be accurate and logical, it is advantageous to frequently resort to this method, merely as an easy check on the proper functioning of the apparatus. A disadvantage of all electrical measuring devices for determination of soil corrosiveness, is that defects in equipment are apt to produce high resistance readings. Therefore if a soil is suspected as belonging in one of the classifications of corrosion requiring protection, and consistently high resistance values are secured, the apparatus should be carefully examined and if possible compared in the same soil with other identical apparatus. However, in comparing two similar apparatus, a variation of as much as ten per cent between the two should not be taken to mean high degree of inefficiency on the part of either or both, as such a difference may normally be expected.



Shepard Rod Meter Scale. Note provision for checking battery voltage.

A procedure using an earth auger, or some other form of rod with which to create a hole, is not entirely essential. Practically all modern corrosion surveying rods are designed and built so that they may be driven in ordinary soils without recourse to first drilling a hole. A wood mallet, or similar hammer, is preferable to a regular metallic sledge when driving the surveying rod itself. If blows must be struck which will in any way distort the metal, or cause excessive vibration of the rod, it is preferable to use other methods of first obtaining a hole. When the rods are used in an open trench, there is no necessity for first drilling a hole, as readings should be taken immediately following penetration of the soil by the two electrodes.

Breakage of the cones or points which constitute the electrodes of the rods, is usually a delaying factor in the progress of a survey and it is, therefore, advantageous to have spare equipment convenient at all times.

Some operators follow the practice of pouring water into test holes before using the rods. This practice originated from the knowledge that the resistance of soils at or near the saturation point is the real criteria of the maximum rate of corrosion. The difficulty is to saturate the soil uniformly between the two rods. However, even a partial wetting assists in securing a result nearer to the actual, than without the moistening process. Care must be exercised to allow the water to disperse, as a reading taken when the rod is actually immersed is not desirable. Many soils will not allow a rapid absorption of the water. The most accurate procedure is to take the readings in soil as found, secure a sample and determine actual moisture content, then conduct the necessary laboratory tests to determine the correction factor. The moisture content need not be determined for each test hole, but, depending on local conditions, may be made once daily, or more frequently when changes in soil type occur, following obvious changes in moisture content, after noticing actual changes in the physical aspects or coloring of a soil, or following other changes easily discernible to the experienced surveyor.

Location of Tests

The location of each test is a matter of local conditions and the information sought. On distribution systems every fifty feet has become a common spacing. The selection of fifty feet is a development from experience on city distribution systems where many highly localized conditions occur. In many localities there is practically no change in the rate of corrosion in large areas, in which case a test every fifty feet is too frequent. The spacing can be developed in each locality by first outlining the general soil types. A few scattered tests in each type would indicate whether differences of a critical value occur. Should critical differences

Shepard Rod in open trench survey. Rod may be used at an angle.

occur, a small section may be surveyed by a test at each street intersection. If the change is found consistent and uniform from one value to another, no greater frequency of testing is warranted, as values for any intermediate points could be interpolated. Should the values be inconsistent, variable, or both above and below the division above which no protection would be required, a further decrease of the interval would be necessary only in the areas having a sufficient frequency of high resistance readings, so that interpretation would be difficult, or some question may arise as to protection being unnecessary. In areas where the preliminary test data may be inconsistent, but all of a degree to warrant protection, additional test holes would not be necessary although they may be interesting.

Where changes from one soil type to another are gradual, or can not be clearly defined, the spacings should be decreased, especially when the preliminary tests resulted in one soil not requiring protection.

The surveyor, therefore, should have considerable leeway in selecting spacing to secure the most economical result. Following office plottings of field observations, there may be some doubt in specific areas, and additional data may be advisable. Returning and making additional tests does not usually add to the total cost, particularly on distribution systems. The reason is, that if more observations are desired, a sufficient number are needed to require one or more full days of testing in a comparatively small area.

In fully paved highways, the original observations, whether closely spaced or not, are usually considered only as preliminary, and are supplemented with tests in the open trench at the time any extensive main laying is in progress. The open trench tests are a protection against highly localized, artificially caused conditions, which may corrode bare mains and result in expensive breaking of pavements. The spacings of these open trench tests would again become a matter of the surveyor's judgment. Both bottom and sides of trench are usually surveyed. Uniformly spaced vertical tests in the trench side are not usually essential, as divisions between soil types, or character of fill, are clearly visible, and only one reading in each strata is necessary, with an occasional additional reading as a check. For the purpose of accurate plotting, a clear description of the soil, and the depths of each reading are necessary.

On transmission systems, the spacing is also established as in a distribution area. First, a preliminary observation by riding the proposed route and noting soil type changes, a preliminary electrical survey, gradually increased in intensity until the desired information is secured. Returning for additional field observations is more costly than on distribution systems, and a survey gradually increased to the desired intensity is ordinarily less in total cost than arbitrarily assumed procedure.

Estimating Soil Surveying Costs

On distribution systems, a single field man usually produces the most economical survey, but on transmission mains, particularly those on private rights-of-way, two men are necessary as an economy, and frequently a third party in the form of a part time chauffeur may decrease costs.

From widely varying sources of information, it appears that a single man can make 25-30 tests each day in a concentrated territory, such as on a distribution system.

In the works of A. B. Allyne, previously mentioned, he has indicated a cost for equipment, salary, transportation and technical supervision on distribution systems of the Southern Counties Gas Company, of 25-30 cents. Other engineers have confirmed this range of cost, once the procedure has become standardized.

The unit cost for tests on transmission mains is too variable to arrive at a reasonable average. The cost for each test is higher than on distribution surveys, but the total cost may be equal for each mile of main, due to lack of difficulties from hard surfaced highways, and a usual greater distance between each test location. As actual testing at each location would only require a few minutes, costs may easily be estimated, knowing the traveling time required to reach the initial test location each day, the traveling time between each hole, and the return time from the final operation of the day.

Test Location

The exact location of each test with respect to the existing or proposed main location is important. The ideal location is immediately at the main position, but practical and economical considerations may make a slight deviation advisable, and yet data of value can be secured. For instance, at the time of survey, the right-of-way for a transmission line may not have been cleared, and certain parts be inaccessible. Observation would indicate the uniformity of the soil, and the actual tests may be made in the same soil type, but offset from the main location. On a distribution system, the space between curbing may be completely surfaced, but the soil be exposed at some point between the curb and building line. Tests may be made in the exposed soil, or even on adjoining private property, but the potential differences between the main and test locations requires a higher degree of judgment to properly interpret the field data, and assurance may only be complete by taking final readings in the exposed trench. The soil on private property abutting highways is more apt to be the virgin soil than that on highways. The slope of soil strata may alter conditions at the main as compared with the test site. Elevations of tests should be on datum easily tied into that of the main.

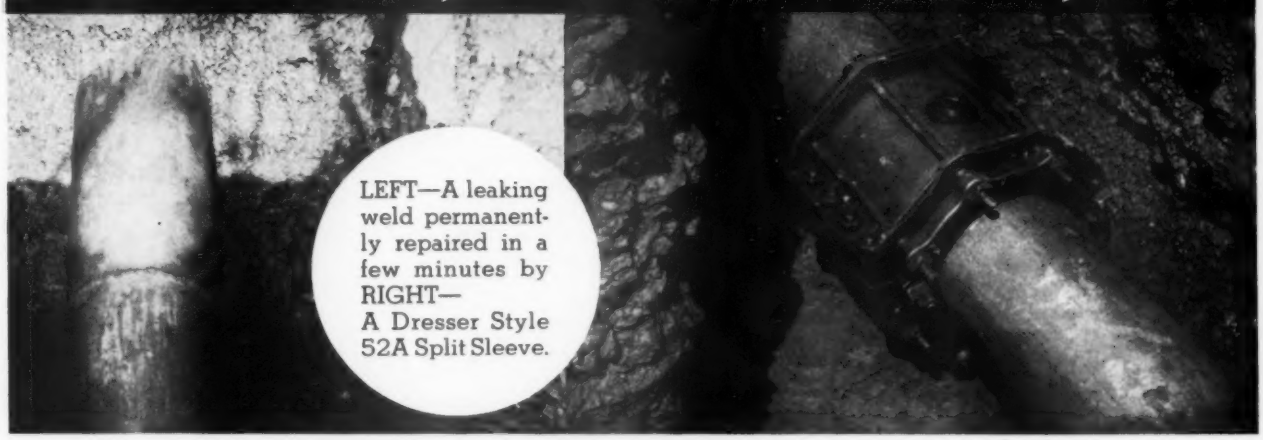
Extensiveness of Shepard Rod Application

The extensiveness of Shepard Rod application has been controversial, but, with recognition of the cited disadvantages of any electrical method, experience of many unaffiliated surveyors in this and other countries has clearly demonstrated a value in all types of soils. In sand, gravel, shale and rocky soils, the occasions when electrical measurements have been indicative of corrosiveness have been fewer than in soils retaining a larger percentage of moisture. However, the fact that on occasions, even in these soils, electrical readings have been indicative of corrosiveness, recalls the generalization that where such readings indicate a corrosive soil, such an interpretation is correct, and that additional information is only required where the readings indicate a high resistance. Because resistance readings in excess of 10,000 ohm-centimeters are found, and actual failure has occurred, discarding the use of electrical methods in acid soils is not warranted, but rather indicates the use of such a method as one step in a program. The checking of soil corrosivity in all types of soil by other methods, when the electrical method indicates no need for protection, is desirable.

(Continued on page 62)

A DRESSER SPLIT SLEEVE *Repairs* Almost Any Pipe-Break

..Quickly! Permanently!



LEFT—A leaking weld permanently repaired in a few minutes by RIGHT—
A Dresser Style 52A Split Sleeve.

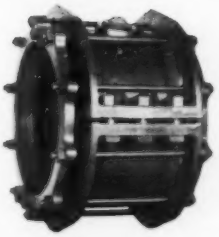
Ordinary labor installs a Dresser Repair Sleeve over a break in just a few minutes, without service interruption, and oftentimes without even reducing the pressure—and you'll never have to go back and do the job over again. The Dresser end and side packs give an *instant*, lasting seal, and provide flexibility to prevent a repetition of the break.

There's a Dresser Split Repair Sleeve for every type of break or leak in steel pipe or steel-pipe joints. One or two of these rubber-packed Sleeves in stock may save you hundreds of dollars in emergency repairs.

When ordering, specify style number, outside diameter of pipe, working pressure, and type of pipe-break or pipe joint to be repaired. *Rush orders are given special attention.*

S. R. Dresser Manufacturing Co., Bradford, Pa.

In Canada: Dresser Mfg. Company, Ltd., 60 Front St., W., Toronto, Ont.



STYLE 52A

Completely encloses and permanently repairs *plain circumferential welds, screw collars, welded bell-and-spigot joints,* and *double-bell welded joints.* Covers pipe-splits or holes up to 8" in length. For working pressures up to 500 lbs. per sq. in. For all steel-pipe sizes from 4" I.D. to 26" O.D., inclusive. Write for further information.

STYLE 73

A light, inexpensive Split Sleeve. Encloses and permanently repairs *circumferential welded joints* and *screw collars,* as well as splits or holes in the pipe up to 8" in length. Two or more can be joined together in multiple installations for longer breaks. For working pressures up to 250 lbs. per sq. in. For all steel-pipe sizes from 2" I.D. to 12" I.D. inclusive. Further information on request.

STYLE 54A

Style 54A has sufficient inside clearance to enclose completely, and repair permanently, leaking joints of the *bolted type.* Recommended for working pressures up to 500 lbs. per sq. in. Available in all standard steel-pipe sizes from 2" I.D. to 26" O.D. inclusive. Write for further information.

CAST IRON PIPE: *Styles 57 and 26 Split Repair Sleeves are available for enclosing and permanently repairing breaks in the straight run of cast-iron pipes, and broken or split bells.*

KEEP A DRESSER SLEEVE ON HAND FOR QUICK REPAIRS

Grouting Machine Used to Meet Problem of Back-Fill Settlements

by

Dennis J. Manning

Elizabethtown Consolidated Gas Co.

DISTRIBUTION engineers of the Elizabethtown Consolidated Gas Company have solved the problems incident to settlements of pavement-cuts and tunnel work under paved streets by the use of a compressed air grouting machine.

Trench settlements under paved streets have long been a serious problem to distribution engineers. The settlement of the back-fill, in many cases, causes the pavement to settle or "dish", making it necessary to repave the patches. This procedure is both inconvenient and expensive. The grouting method has been found to be very effective in the prevention of pavement settlement.

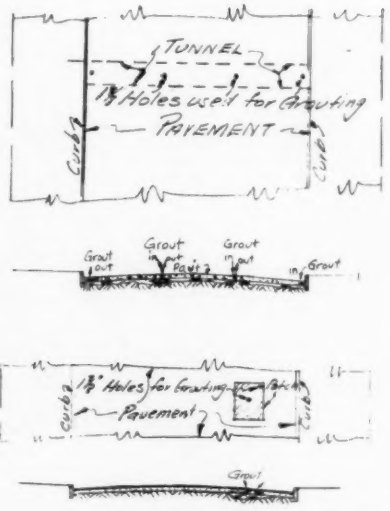
It obviates the necessity of tearing up the pavement to replace settled back-fill and also makes it possible to lay permanent pavement on top of fresh back-fill, as any voids which may develop can be easily and economically filled by this method. Thus it is no longer necessary to lay temporary pavements until the back-fill settles. This, in itself, is a saving of time and money.

Exploring with Light.

When a patch has been in place for some time, a hole, 1⅞", is drilled with a jack hammer. An automobile headlight bulb is then lowered into the hole to see if a settlement of the back-fill has occurred. When such a condition prevails the grouting machine is brought into play.

Hole is drilled in patch

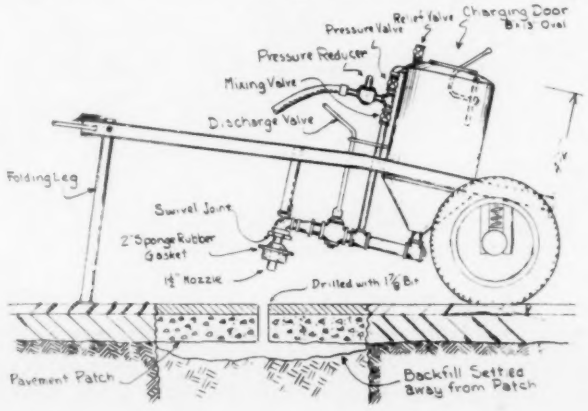
The nozzle (1½" in diameter) of the cement-grouting machine is placed in the hole and a mixture of cement and sand (mixture dependent on type of fill-in required) is forced into the void, filling any space left by settlement of the back-fill and also further compacting the earth.



Above—Plan and elevation of tunnel back-fill.
Below—Plan and elevation of patch back-fill.

The Grouting Machine

The grouting machine consists essentially of a welded steel cylinder with funnel shaped base mounted vertically on a two wheel trailer. It is provided with pipe connections and valves for mixing the grout in batches and then forcing it through the discharge nozzle into the holes drilled in the paving at suitable intervals, or in the center of a patch, as shown in the diagrams. The nozzle of the



Grouting machine mixes and applies the grout.

machine acts as a third leg so that the weight of the machine compresses the gasket and prevents leakage around the hole. The grout travels along under the paving, filling the voids, and oozes up through the adjoining hole. The nozzle is then applied to the second hole and the operation repeated until the entire cavity beneath the paving is filled.

Mixing Operation

Mixing of the grout is carried on in the machine itself. The water is first added to the machine and the air valve opened. This agitates the water so that as the cement and sand are added the mixing is done thoroughly and rapidly. The charging door is then closed and by adjustment of the valves the pressure on the top of the mixture forces the grout through the discharge nozzle. Batches of 2 cubic feet can be mixed and placed or the machine will handle 3 cu. feet of premixed grout. The operation of the machine requires a 100 cubic feet compressor with the pressure reducing valve set at about 15 to 20 lbs.

Compressed air operates grouting machine mounted on trailer.

It has been found that this method has effected considerable savings in maintenance work and that rarely is pavement repair depression noted where it has been used.

Gas Exhibit at Restaurateurs' Washington Convention

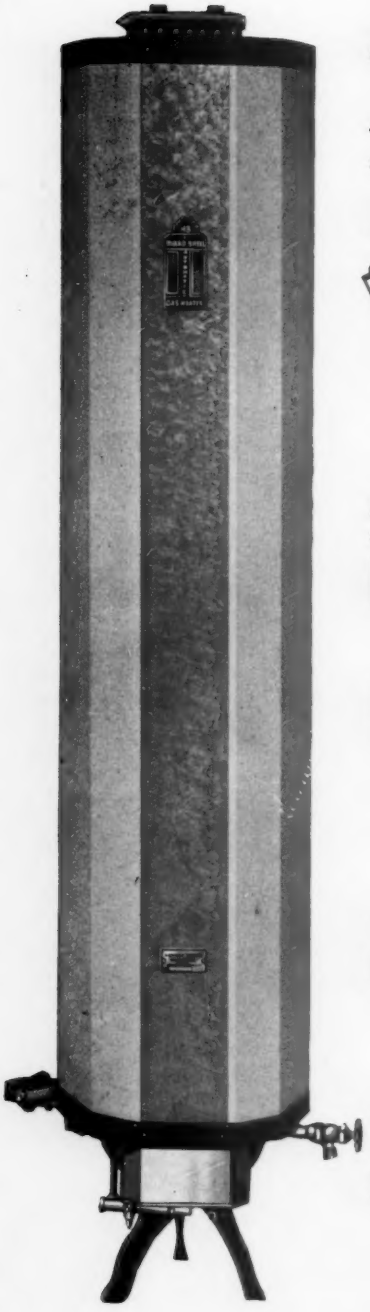
PROMINENT at the immensely successful regional convention of the National Restaurant Association held in America's famous Mayflower Hotel in Washington, December 7, 8, and 9, was the display of heavy duty gas cooking equipment. Sponsored jointly by the Washington Gas Light Company and the Industrial Gas Section of the American Gas Association and a group of manufacturers, this gas display which occupied 56 feet of the Mayflower's main lobby, was one of the largest and most impressive of its kind most of the attending members had ever seen.

Featuring the latest developments in gas ranges and other diversified gas appliances for restaurants, this exhibit was visited again and again by convention delegates and restaurant executives ever on the lookout for better and more efficient equipment and favorable comments were heard from every side. Interest compelling sections of the display included the recently developed top and bottom controlled deck bake ovens, deep fat fryers of improved design, several sections of heavy duty gas ranges, a 10 cu. ft. gas refrigerator, automatic gas space and water heaters, etc., all skilfully spotlighted. Along the wall was a 50 ft. sign reading "Gas is Best for Cooking, Refrigeration, Water Heating and Space Heating."

While this was a regional affair, the attendance was around the 2000 mark and was drawn from twelve states. Many gas company and gas appliance manufacturer representatives took advantage of the opportunity to increase their contacts in the restaurant trade. In fact substantial lists of real prospects were obtained. The gas exhibit, manned by representatives from the Washington Gas Light Company and from manufacturers, was by no means the only display of gas equipment. Many of the other exhibitors showed various gas operated gadgets such as gas coffee brewing sets, improved gas coffee urns, the new automatic gas toasters, etc., etc.

It is certain that the great number of restaurateurs who saw this immense gas exhibit will carry back to their widely dispersed homes the significant message "There's Nothing Like Gas for Commercial Cooking!"

The gas exhibit was under the supervision of Henry M. Brundage, Jr., General Sales Manager of the Washington Gas Light Company. The Association's cooperation was through the Committee on National Industrial Displays of which Harry A. Sutton is chairman.



M-S 30-8-A

Completely Assembled

Heating element and insulation combined — one complete unit at low first cost.

Quickly installed by one man.

No liming, sediment or circulating trouble.

24-gauge steel jacket; attractive two-color Morocco finish.

ANOTHER HIT! . . .
AT THE A. G. A. CONVENTION

AGAIN

THE MARKET *for* AUTOMATIC GAS WATER HEATING

HANDLEY-BROWN OFFERS

NEW MIRRO-SHELL SIZE

The Revolutionary New Method That CONVERTS OLD RANGE BOILERS into AUTOMATIC GAS WATER HEATERS . . . Highly Efficient . . . Attractive Appearing

MODEL 30-8-A

10,000 B. T. U. INPUT *for* 30-GALLON TANKS

SUPPLIES UP TO 160 GALLONS OF 90° RISE HOT WATER PER DAY

10,000 B.T.U. input with 30 gallons of storage capacity and Mirro-Shell's high efficiency gives the user an exceptional hot water service for a very low first cost.

For both Manufactured and Natural Gas Companies

BUILD GAS LOAD • BUILD GOOD WILL ALL WITH THE SAME APPLIANCE

For complete details, prices, terms—on this and other models—

WRITE

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN

Developers and Pioneers of the Low-input Gas Water Heater

The Economics of Energy Distribution

As Affecting a Sound Social Order

A. M. BEEBEE
Rochester Gas & Electric Corp.,
Rochester, N. Y.

THE essentials of a sound system of society are:

1. The building up of the purchasing power of our country.
2. The development of energy in its cheapest form to become the slave of our people.

One without the other is of doubtful value. The former makes the latter possible and enables us to absorb and enjoy the fruits of the use of energy.

The development of energy has been, from time immemorial, the keystone of the progress of civilization. It bids fair to continue in that position in the future. Energy is the means whereby our wants can be satisfied without drudgery.

Let us consider the main sources of energy in our country and then let us compare our uses of this energy in the past three or four years, when we feel we have been in this valley of despair, with our uses of them during the so called "hey days" of 1923 to 1929.

TABLE I

Energy Used in the United States	Last 3 Years %	1923-29 %	Change %
Natural gas	7	5	+40
Water power	9	5½	+63
Oil	23	18½	+24
Coal	45	60	−25
All other forms	16	11	+45

Later we will see the great significance of this table when the premises which we have outlined are considered in greater detail. Attention is called, however, to the large increase in the use of oil, natural gas, and water power, and the decrease in the use of coal.

The only apparent way that our purchasing power can be built up is by reducing unemployment, and unemployment cannot be relieved by developing at increased cost, sources of energy that are scant employers of labor.

Under our present system for distribution of the good things of life, it seems a fundamental fact that the production of energy by methods utilizing small amounts of labor cannot be justified unless the cost is less than that of energy produced by other methods. Of course, it is true that we cannot stand in the way of progress and when energy employing less labor in its production can be produced cheaper than other forms, eventually society as a whole will benefit, though in the transition period heart breaking adjustments may have to be made. However, when such is not the case, it absolutely has no place, at least not until we have solved our unemployment problems. Please bear these points in mind, as we consider the tables which follow.

Now let us consider these various sources of energy and their estimated known reserves. Reserves are many times subject to dispute, but the following figures are taken from authorities of repute and are sufficiently accurate for our needs.

The above figures are most significant. The total potential water power is but three times the present installed capacity which (from Table I) now supplies only 9% of our energy. Therefore, the total water power in this entire country can only supply some 27% of our present requirements. These figures emphasize the statement frequently made by many men, such as Edison, Fieldner and other students of energy, that coal is the fuel of the future. In this regard our country has, an often unappreciated fact, the good fortune of being blessed with a tremendous coal supply and as time goes on, this fact is apt to become the largest single factor in the future of this country. It bids fair to eventually help us become the most powerful country in the world.

Now let us consider the labor employing features of these various sources of energy, together with their relative costs.

TABLE II

	Ultimate Known Reserves	Annual Present Rate of Use	Life at Present Rate of Use
Natural gas	40 Trillion cu. ft.	2 Trillion cu. ft.	20 years
Oil	13 Billion barrels	910 Million barrels	14 years
Water power	38 Million hp.	12 Million hp.	
Coal	2,500 Billion tons (¾ recoverable)	390 Million tons	4,800 years

Natural Gas and Oil—The production of natural gas and oil of course employs labor but to a rather limited extent, though in general its costs of production per B.t.u. are considerably higher than for coal. Its transportation in pipe lines, however, requires a minimum of labor.

Water Power—Here probably is the world's smallest employer of labor and in general its cost is greater than coal. Recent studies show that only some 13% of the cost is all that goes to cover operation and maintenance, and 87% to cover fixed charges.

* *Presented before Technical Section of A. G. A. Convention, Atlantic City, N. J., Oct. 27, 1936.*

Coal—Employs a whole army of labor at the mines mining the coal, on the railroads transporting the coal and at the plants converting it into useful power, together with the steel and allied industries that feed the railroads, mines and power plants. It also is our cheapest and most abundant source of energy. Recent studies show that some 56% of the cost of steam produced power goes to cover fuel operation and maintenance expense at the plant; the balance of 44% to cover fixed charges.

Summary of Table I

At this point may we call attention to the fact from Table I that in our period of unemployment despair the non-labor using sources of energy, water power and natural gas, have increased 63% and 40% respectively, while coal, (our greatest labor employing source), has decreased 25%. This point is worthy of more than passing interest. And more important perhaps is the fact that some of the non-labor employing forms of energy have reserves that give indication of only lasting a comparatively short span of years. This leads to the conclusion that these limited forms of energy of high form value, should not be further pushed on a general energy market, especially if, in their development, they are non-labor utilizing. Such forms of energy should be conserved for their rightful, logical, market to enable a longer life of the present supply to result. Not to do so in these times of stress merely adds to our unemployment.

Imagine, if you will, the chaos that would result if the coal industry should suddenly decide to force onto an unwelcome energy market its total reserves over a period of a few years. Yet this principle is the basis of some of the plans to be discussed later.

Summary of Table II

Also, from Table II, we can conclude that 10 to 20 years from now, when our reserves of non-labor using fuels fall off substantially, a cycle of employment may result which will make for a return of unusual prosperity; so that ultimately we should have nothing to fear. It is, however, the immediate present with which we are concerned. Are we moving in a direction that will hasten or retard that return?

It seems unfortunate that surplus fuels should make for hard times. It is not the surplus of fuels that causes trouble so much as the fact that the ones we are tending to use, at added cost, do not aid in the utilization of our labor and therefore tend to restrict purchasing power.

In order to visualize the value of coal a few comparisons may be of value. Few realize that a pound of coal has an energy equivalent four to five times that of a pound of the most violent explosives such as T.N.T. A ton of water must fall a mile to develop the energy equivalent of a pound of coal, and when all conversion efficiencies are considered, it must fall ¼ mile to produce in electrical form the energy equivalent that can be generated from a pound of coal.

In fact, the entire flow of the Niagara river over the great Niagara Falls is only equivalent to an imaginary coal stream flowing at a rate only slightly faster than a walk in a pipe 18" in diameter.

Summary

In summing up, therefore, we may say that until energy can be more cheaply produced by forms other than coal, or until we have solved our unemployment situation, coal is our fuel of the future.

However, before we draw further conclusions from the previously outlined data, let us consider a few more fundamentals.

As previously mentioned, energy is our keystone of progress, by providing ability to do work (mechanical energy), heat and light. Energy can be transported and converted into its various forms such as heat, light and power. Gas and electricity are merely convenient forms of energy which can be readily transported. Why should we have two forms of energy? Why not concentrate on just one? The answer is that there is a very good reason why two forms of energy and suitable methods of distribution have been developed.

It is interesting to study any highly developed industry. As a rule we find some definite economic reason for its development. Our industry is no exception to this rule.

Energy from various fuels can be converted into useful heat with a high efficiency of conversion, in general from 60% to 85%. However, when such a source of energy is converted into power or mechanical energy, large losses are involved, whether it be by gas engines, turbine, steam engine or electric generator, so that the resultant efficiency of conversion to power will run from 15% to 35%. Please bear this point in mind, as this is a very vital and important fundamental which has been responsible for the two forms of energy distribution, as explained below.

Power and Heat

As mentioned earlier, gas and electricity are merely easily transmitted forms of energy. Gas is energy in a form that is readily and efficiently converted into heat. However, to convert it into mechanical energy or power, involves the large losses already referred to. Electricity, on the other hand, is potential mechanical energy and can therefore be converted into useful work with a high degree of efficiency, even as high as 90%. However, in the conversion of the energy of any fuel into electricity the large losses have already been incurred, which gas or any other fuel must involve to be used for mechanical energy or power.

Therefore, in the mechanical energy fields, power fields, or light, we find gas has generally no great fundamental conversion advantage and electricity has the advantage of economic application.

But where heat is desired, the use of electrical energy which in its production involved heavy losses, to compete with energy in the form of gas which escaped such losses, is like trying to make water run up hill. Please bear this last statement in mind, as we later develop our story.

It is true that in the eventual utilization of heat, electricity has generally a higher efficiency of application than gas, for the reason that gas involves the heat losses in its products of combustion. However, these losses are generally of an order of 10% to 15%, which is but a small part compared to the 65% to 85% loss incurred in the generation of mechanical or power form of energy.

Advantage of Gas

Therefore, where light and power are involved, the electrical industry has a just and due field but where heat is desired the fundamental slogan of our industry holds true. "Where heat is desired it can be better done with gas."

Of course, in all these comparisons, we are speaking generally. Specific exceptions may always be found to any general rule. To perhaps better visualize the above fundamentals, the following table may be of help.

TABLE III

100% REPRESENTS THE ENERGY IN THE ORIGINAL FUEL

For Heat	Gas %	Electric %	For Mechanical Energy or Power	Gas %	Electric %
Energy in fuel.....	100	100	Energy in fuel.....	100	100
Loss in conversion process	20	75	Loss in conversion	20	75
Energy left for distribution	80	25	Energy left for distribution	80	25
Loss in transmission, conversion and utilization	24	5	Loss in transmission, conversion and utilization	60	5
Heat utilized	56	20	Energy utilized	20	20

It is for these reasons, therefore, that both gas and electricity have developed to supply the various energy requirements of a community, since each has a definite field in which it has great advantages. This is also why, for the good of society as a whole, these two forms of energy should continue to be available in the future. It is when we try to force the use of one form of energy into a market for which it is not the most economic that troubles arise, which sooner or later will adversely affect and delay our return to a sound economic condition.

This situation just outlined in Table III also is the reason which eventually will make the so called "combination company" a sound instrument in our economic picture, since under such operation there is involved less duplication of expenses and also there is a reduced tendency to force either type of energy into markets for which it is not intended and for which it is not economic.

While we are discussing this subject, let us digress for a moment and see how these fundamentals have worked out practically.

TABLE IV

Increase in number of electric customers in 15 year period	415%
Increase in number of gas customers in 15 year period	138%
Increase in energy sales in electricity in 15 year period	204%
Increase in energy sales in gas in 15 year period	177%

It will surprise you that the average use of energy in a community or in a home in the form of heat is from 3 to 10 times that necessary for light and power. Let us consider a typical home with an average consumption of 50 kw-hr. a month. This home is using 50 x 3412 B.t.u. or 170,000 units of energy. This same average home without househeating uses 3,000 cu.ft. of gas which at 540 B.t.u. means 1,630,000 energy units in the form of gas or nearly 10 times as much as is used in the form of electricity. It is also interesting to note that the average cost to the customer for 50 kw-hrs. of electricity is substantially identical to that for 3,000 cu.ft. of gas which latter contains 10 times as much energy. When we consider the total available logical market, including househeating, the factor becomes even larger. These features cannot help but impress one with the future of our industry.

Is it any wonder, therefore, that this large market is looked upon with longing eyes by other forms of energy.

Another example that these fundamental principles are not mere theory but actually work out in practise is the rate of development of these two forms of energy.

Let us examine the record of the past 15 years of a company such as the one I happen to represent, which is more or less typical, during which time electric utilization has had a tremendous public acceptance and its most rapid development. It must be remembered that the gas industry was already established when the electric industry started.

In other words, the energy in sales growth in the case of gas was nearly as rapid as the electric and yet the electric to accomplish this had to expand its number of customers over four times as compared with only a slight increase in gas customers. These are interesting figures to ponder over.

Let us see if there are any other fundamentals which may be working in our favor and again we find fortunate conditions. Electricity cannot be stored, while gas can be stored. This means that generating capacity in the case of electricity must be as large as the indicated momentary peak, while gas holders enable generating capacity under average conditions to be installed one-half the peak load. This means a tremendous saving in capital necessary to supply a given load or an investment per unit of energy in the case of electricity which is over four times that necessary for gas.

Distribution costs in the case of gas and electricity to cover customer costs and fixed distribution charges run perhaps only slightly higher in the case of electricity as compared with gas. However, in the case of gas, we are talking about a complete underground system with all the inherent reliability that goes therewith.

These are all points to bear in mind in the picture which we are trying to develop as to what direction we should be pointing to improve our social economic system.

Some Conclusions

Perhaps we are now ready to draw a few conclusions. I believe we could all be 100% loyal to any plan aimed to pull us out of the depression by sound economics. But what do we find?

At present, when unemployment is our biggest problem, we find vast programs of water power development sponsored and actively promoted by our Government. Such developments are the poorest employers of labor that we know of (except temporarily in the installation thereof) and the energy they furnish usually costs more than that of an equivalent amount of energy developed by coal. Furthermore, it is being proposed to almost force the use of this energy where heat is desired in cooking, water heating and the like, which might better be done by gas. Could anything be more uneconomic.

This plan is apparently patterned after the so called progress along these lines in countries like Canada and Sweden, without careful analysis of the fact that there may be sound economic reasons for the extensive hydraulic developments in those countries. Canada and Sweden have relatively no coal. They have no alternative. Such developments in their country are sound. Every bit of energy developed by water means that much less coal to be imported from foreign countries and a smaller drain on their national wealth; they should, therefore make every effort to develop hydro-power.

Such conditions may even possibly justify, as a national policy, the subsidizing of hydro programs and selling the energy below cost to the householder as they do to force and develop a market for electric cooking and water heating.

In this connection it is interesting to note that these highly advertised tremendous kilowatt hour consumptions per customer, which advocates of the Government program point to with pride as to what is possible, exist only in places where cheap fuels are not available. They would lead us to believe it was merely the result of cheap rates. Nothing is further from the truth. Ontario, Manitoba, the Pacific Northwest and Sweden have developed tremendous electrical consumption per customer, purely because of the expensive fuel conditions, or subsidized low rates and the government imposed duties on fuels from foreign countries. Those who may be sympathetic with the administration policies should consider Los Angeles, Jamestown or any of a hundred other places which have low electric rates but where reasonably priced gas is available and which have only developed kilowatt-hour consumption per customer below the average, if anything. The forces which bring about these large consumptions are not the ones which might first appear on the surface.

That eventually the economics of the situation will prevail and that these Hydro programs have no real benefit to society can be readily shown by the following.

The promise of low electric rates has been offered on the assumption that a tremendous increased consumption will result, which will so reduce distribution costs as to make such rates economic. These theories may be sound in expensive fuel regions. However, the large increased use of electricity is predicated on the use of electricity for cooking and water heating, which, as outlined earlier, in this country is not economic and rightfully belongs to another form of energy distribution. The reason for this is because, even when neglecting the fact that gas generally involves greater use of labor, the service of cooking and water heating is now supplied to a customer by gas at a considerably lower cost than to do the equivalent work by electricity, even under the Power Authority rates. Proof of this will be found in the following table (Table V) which compares an average home using cooking and water heating served by an existing combination gas and electric service with similar all electric service under the proposed New York Power Authority rates.

In our country, it seems obvious that the worst possible thing we could do would be to build vast hydro-electric power developments when energy can be developed more cheaply from coal and supplied to society through a whole chain of labor employing industries, such as the mines, railroads, generating plants, gas plants and the steel and allied industries which supply these industries.

True these Hydro-Electric ventures will give brief and temporary relief through the labor employed in building them. But we must give heed five years, or ten years, from now, when these plants become Frankensteins to turn and plague the society that conceived them.

TABLE V

COMPARISON OF EQUIVALENT SERVICE—GAS vs. ELECTRICITY

All Electric Home		Present Gas and Electric Home	
Lighting, etc.	30 Kw. hrs.		30 Kw. hrs.
Cooking	125 Kw. hrs.		1,530 cu. ft. gas
Water heating	350 Kw. hrs.		2,740 cu. ft. gas
Refrigerator	50 Kw. hrs.		1,800 cu. ft. gas
	555 Kw. hrs.		30 Kw. hrs. and 6,070 cu. ft. gas
Cost of above even at N. Y. Power Authority proposed rates =	$8.82	Cost of above at present Gas and Electric rates =	
		30 Kw. hrs. =	$1.81
		6,070 cu. ft. gas =	5.86
			$7.67
Some taxes are assumed in the above, but nowhere near what the private utilities pay.		We pay taxes	1.35
		Net customer cost	$6.32

If we leave refrigeration off, the figures are as follows for the cooking and water heating and lighting:

All Electric		Present Gas and Electric Home	
505 Kw. hrs. at N. Y. Power Authority rates =	$8.16	30 Kw. hrs. =	$1.81
		4,270 cu. ft. gas =	4.27
			$6.08
		We pay taxes	1.11
			$4.97

It may be argued that these points may apply only where gas service is available. How about the territory that does not have any gas service? When it is realized that in New York State 91½% of the families already have gas service the insignificance of this point immediately becomes apparent. In fact, in the by-ways the energy for heat uses in the form of bottled gas can be made available at a far less cost to society as a whole than by those costly rural electric lines of which we hear so much.

That the fundamentals outlined earlier in this paper, actually work out in practice, it is interesting to note the result of the activity in T.V.A. Territory.

As near as can be determined, the activity thus far has only tended to waken the gas industry in that section to its real strength.

Witness the experience this past year on the part of the gas company in Knoxville.

"Our cubic foot sales have for several months been pretty consistently running 20% ahead of corresponding months the year previous.

Three-fourths of 1% of our total number of customers bought electric ranges to replace gas. This is at the rate of 1% per year. For each such electric range replacing gas, we sold 4.3 and rented 5.4 gas ranges, a ratio of 9.7 to 1 in favor of gas. However, as 37% of our range sales and 17% of the rentals were to replace obsolete gas equipment, the ratio of electric ranges replacing gas to gas ranges replacing other fuels was only one to 7.2.

The ten months' comparison on water heaters is even more favorable.

Electric water heaters replaced gas at the rate of one-tenth of 1% per year of our total customers and for each electric water heater thus sold we made 48 new installations of automatic gas storage

(Continued on page 58)

Yes, it's a Water Heater — believe it or not!

IT looks like a kitchen work table... but it's actually the new American-Bosch Kabinette Water Heater. Enclosed within its sleek, trim smartness, are heating unit, automatic controls, and the revolutionary ball tank of 20 gallon capacity.

The Kabinette casts aside all precedent in water heater design . . . modernizes it... brings it abreast of other kitchen conveniences in beauty and extra utility.

Its chromium-finish work top is table high ... forming a working surface of even height with range, drain, table. And with these, too, its gleaming white enamel and black trim are in beauteous harmony. Yet it's low in price; low in operating cost.

Will it sell? *Will it!*

Size 36" high, 25" wide, 25" deep.

Situations Wanted

by these other gas salesmen—sponsored by American-Bosch.

American Bosch Konverto—converts the old-fashioned water heater into a modern automatic storage system.

American-Bosch No-Tank Water Heater—supplies automatic hot water, instantaneously, without a tank or hot water pipes.

American-Bosch Ball-Tank Water Heater—the revolutionary automatic gas water heater with the globe-shaped tank.

AMERICAN-BOSCH KABINETTE

Gas Appliance Division: **UNITED AMERICAN BOSCH CORPORATION,** SPRINGFIELD, MASS., New York Boston Pittsburgh

WITH AIRTROL ECONOMY
and
THE LONG LIFE OF BONDERIZING

AIRTROL ACTION

is a great economizer. Automatically closing when the burner is not in operation, it shuts out cold air draft through the heater. When the burner ignites it automatically opens to permit the inflow of primary and secondary air. With the Airtrol water stays hot longer in storage.

BONDERIZING

Pittsburg exclusive method of resisting rust from condensation and obtaining a more lasting enameled outer finish. All steel parts of Pittsburg Streamlined Storage Heaters are treated with Bonderite, a surface coating which becomes integral with the metal, resists rust and adds to the life of the heater.

Pittsburg's Streamline Series of Automatic Gas Water Heaters meet the modern demand for good looks, better engineering and efficiency and economy features.

Pittsburg's Streamlined Merchandiser, a modern selling plan, covering the product in detail, opens the door to greater sales.

PITTSBURG'S New 75-Gallon MONARCH IS NOW READY FOR DELIVERY

Inspect one of these volume-sales-appeal heaters. One will be sent for test on request.

THE PITTSBURG WATER HEATER CORPORATION

PITTSBURGH, PENNSYLVANIA

New Gas Bake Oven Embodies Important Principles

J. B. NEALEY
American Gas Association

Deck Type But Each Shelf Constitutes an Oven by Itself With Independent Top and Bottom Heat and Control

AN oven, entirely new in principle and operation, has recently been developed. Designed for the small baker, rather than for the large producer, it has no traveling conveyor, only a tier of shelves or baking hearths on the sectional bookcase idea. Each shelf constitutes an oven by itself, with independent top and bottom heat, controlled by means of separate gas burners, controls and vents. And yet this new oven is not a competitor of the deck ovens used for the past 25 years, rather it supplements and tends to round out this line of ovens. In developing this oven the inventors first made a list of what a modern oven ought to do.

1. It ought to burn gas only.
2. It ought to apply the heat where and when required.
3. It ought to segregate the top and bottom heats.
4. It ought to eliminate excessive ventilation.
5. It ought to employ heat controls and
6. It ought to be well insulated.

The resulting oven incorporates all of these features which puts it in a class by itself. In fact it covers a field that cabinet type gas ovens have not covered before. This is the field of display goods where extreme closeness of temperature control is necessary. It includes display baking for show windows, extra fancy goods for special clubs and banquets, for high class restaurants, hotels, etc., etc.

Breads, biscuits, rolls, etc., are baked by two kinds of heat (1) conduction from the hearth and pans to the bottom and (2) convection from the hot air passing over the top. Heat usually passes much faster into the bottom of the goods by means of radiation and conduction than it does into the top of the goods by convection. In order to meet this condition two independent sources of heat must be set up and controlled separately from each other.

Each Hearth a Separate Oven

To accomplish this each baking hearth of the new oven is built as a separate and complete oven by itself with separate flues and controls for the top and bottom sets of burners. A three shelf oven, then, is a combination of three separate ovens but built into a single unit. In building one of these ovens, the bottom gas burners are placed below the hearth and combustion air passes around these burners beneath the baking surface. The top heat enters the baking chamber through flues in the top and exits by flues close to the hearth. By having the exit flues below the entrance flues a heat pressure is set up. The bottom heat therefore is entirely by diffused conduction while the top heat is entirely by controlled convection.

The temperature throughout the entire baking area of this oven is unbelievably even and this is due, in part, to burner design and top heat distribution. It is also due to the fact that the hearth is of an entirely new aluminum alloy which was specially developed for the purpose and has never before been employed in oven hearth construction.

The remarkable thing, however, is the absolute control of the top and bottom heats. When baking biscuits and rolls the temperature differential was found to be 45 deg. F. for the top and 300 deg. F. for the bottom. These temperatures are maintained automatically by two thermostatic controls, operating in-

dependently, one on each set of burners. In addition, interconnected duplex safety pilots afford both easy lighting and maximum safety. Greater operating economy is also obtained through controlled ventilation and heavy insulation. These latter features increase the stability of the baking conditions. There is no radiation from the side walls of the baking chamber to the baked goods.

Unique Gas Burners

It might be well to state here that the gas burners are of unique design. They are long and rectangular in cross sections with the perforations on one face just below the top edge. With this design, every bit of air entering the oven flows over these perforations thus affording perfect combustion. The bottom burners have a partition wall inside dividing them into two longitudinal chambers. The gas enters one chamber and flows through carefully sized holes in the wall into the other chamber from which it is burned through the ports. This provides an even pressure throughout as the venturi is located at the end of the burner.

Another unique feature of this oven is its extreme flexibility. Not only can top and bottom heats be regulated through a wide range of temperatures but also the heat can be thrown from one part of the oven to another; front to rear, side to side. Thus the oven can be adapted to operate perfectly under unusual conditions. The design of this oven lends itself nicely to the introduction of steam when that is necessary. As the heat distribution is not dependent upon the flue pull, no stack is required.

This changeover from stack pull to heat pressure eliminates excessive ventilation and consequent shrinkage in meats and drying out of baked goods. The presence of heat pressure in top heat makes possible a uniform top coloring of all types of foods from the lightest meringues to the heaviest of roast meats.

Two Types of Decks Available

The baking decks are 8 inches high built to accommodate all types of baked goods such as breads, biscuits, rolls, cakes, pies and cookies. The specially built roasting decks are 14 inches high to permit the uniform roasting of large roasts and turkeys or the baking of beans and other similar products.

Ruggedly and beautifully built, with stainless steel and transite linings these units can be completely disassembled in five minutes. The hearth is quickly removable from the front and all parts are easily accessible for cleaning. There are no gas cocks or manifolding visible. The hearth of aluminum alloy is specially prepared so as to offer a smooth surface to the pans when pushed in when hot. No firebrick is used. The entire equipment is designed along modern straight lines with a maximum of exposed plain surfaces which are easy to keep clean.

Due to the fact that this new oven, incorporating the new features that it does, will naturally invade fields that are somewhat new for gas ovens; the Committee on Industrial Gas Research of the American Gas Association, sponsored its development and some early tests in bakeries. The first factory models were tested under the Committee's auspices at the Cleveland Laboratories of the Association using both manufactured and natural gas. After these tests were conducted and the performance of the oven checked, then and not until then was its manufacture begun. The inventors of this oven are Robert A. Staniford and Carlton E. Roll of The Brooklyn Union Gas Company and the oven is being manufactured by the Crawford Oven Company of New Haven, Conn.

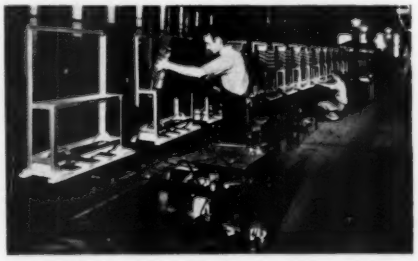
Modern Water Heaters Manufactured In Modernized Plant

In line with the progress of the times, the Pittsburg Water Heater Corp. over a year ago started a plant modernization plan which is now completed. One of the principal changes was the installation of a conveyor system, which constitutes a production conveyor and a distribution conveyor which carries the crated product into the car door.

The assembly line flows past the workers who perform the various assembly operations so that the water heater reaches the testing department completely finished. Other conveyors handle the sheets to the enameling tanks.

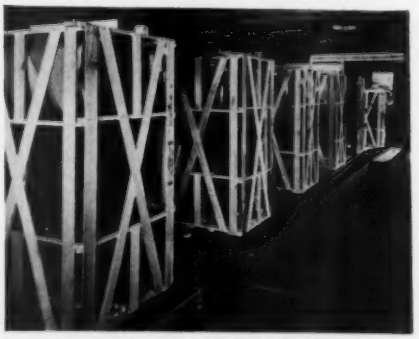
In a visit at the company office, your correspondent was received by "Joe" Taylor, recently appointed Sales Manager, who took time out to guide us around the plant. He pointed out that in addition to the conveyor system as described above, a bonderizing plant had been installed. This is the latest method used by the automobile industry for coating steel sheets prior to the application of the duco.

The newly elected officers of the Pittsburg Water Heater Corporation are: Mr. Grant Curry, President and Chairman of the Board of Directors; Mr. T. F. McNally, Vice President in Charge of Factory Practice and Purchases; Mr. L. W. Coate, Secretary and Treasurer; Mr. J. D. Taylor, formerly well known in the stove industry, but for the past three years with The Pittsburg Water Heater Corp., Sales Manager. A. F. Stephens is General Superintendent in charge of research, engineering and production work.

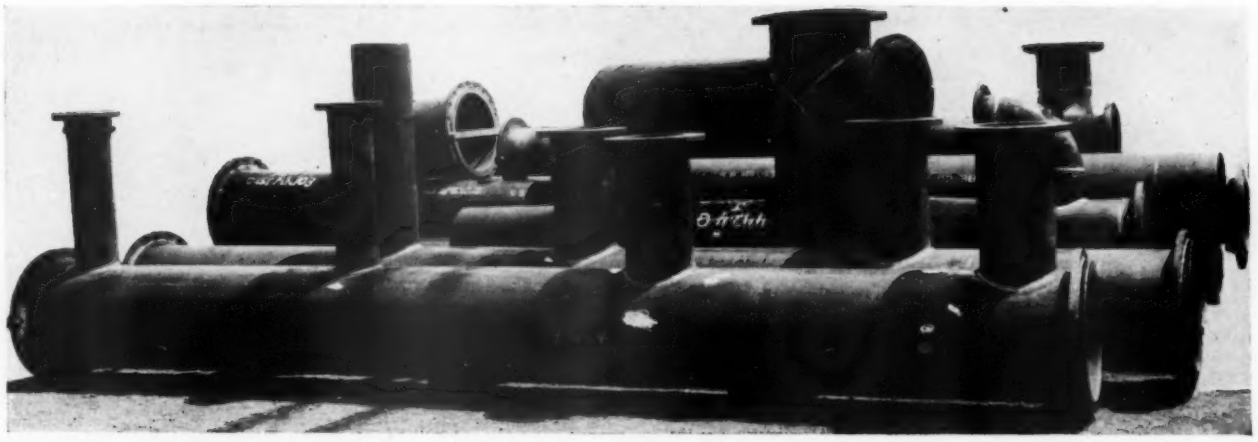


The Continuous Flow Models are assembled on a production line as this view of a parade of Preheaters indicates.

Now the assembly line flows past a battalion of workers who perform their various operations till a moving line finally disgorges the completely assembled, finished heaters.



Conveyor system not only comprises a complete production line but also plays a part in distribution, carrying the finished, crated product, right into the box car door.



HIGH PRESSURE PIPING

This photograph, taken at our shops, shows part of a shipment of Semet-Solvay welded pipe and fittings made for the handling of natural gas under high pressure.

Welding was done according to the 1935 A. S. M. E. specifications for high pressure service. The job passed every exacting test and inspection with plenty to spare.

Come to Semet-Solvay with your plant and processing problems. We are unusually well qualified to serve your needs for equipment that will give improved results from your processes and for working out economies in operation.

SEMET-SOLVAY
ENGINEERING CORPORATION

Engineers* ▾ *Contractors

40 RECTOR ST. ▾ NEW YORK, N. Y.

PERFORMANCE *measures the value of*
BLAW-KNOX GAS CLEANERS

Reduction of Customer Complaints due to dust picked up by gas

"Availability" of Compressors during Peak Loads

Freedom from Dust Deposits on Compressor Valves

Lower Pump Station Upkeep Costs

Fourteen repeat orders from a large transmission system, totaling twenty-six units—indicate a definite confidence in the ability of Blaw-Knox Gas Cleaners to eliminate dust troubles, to reduce maintenance costs, and to maintain public relations.

This large transmission system (name on request) has invested in Blaw-Knox Gas Cleaners as follows:

Number of orders—14
Total number of units—26
First purchase—August 22nd, 1930
Last purchase—August 19th, 1935
Maximum working pressure—450# Ga.
Combined capacity—31,595,000 cf. hr. at 150# Ga. or
59,823,000 cf. hr. at 350# Ga.

This record of purchases indicates satisfaction with results from the equipment and an appreciation of the importance of the *protection* and *transportation cost reduction* afforded by Blaw-Knox Gas Cleaners.

Blaw-Knox Gas Cleaners are fully engineered, reliable and efficient, backed by a manufacturer who accepts the responsibility for meeting your conditions and fulfilling all performance claims. Full information about Blaw-Knox Gas Cleaners, large or small, is yours for the asking.

BLAW-KNOX COMPANY
2070 FARMERS BANK BUILDING · PITTSBURGH, PA.
Offices in Principal Cities

New Equipment

Perfected New Types of CBV Gas Regulators Extend "Reliance" Line

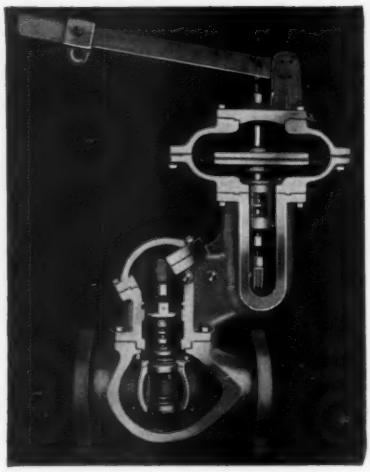
Reliance Regulator Corporation Division of American Meter Company announces a new line of gas regulators featuring an improved combination balanced valve (CBV) unit on which the Reliance engineers have been working for some time.

The new line offers numerous interesting advantages, including interchangeable parts, a unit construction that facilitates any necessary repair, reduced motion and friction, and greater accuracy in regulator control.

A full range is presented of lever weighted, spring loaded and pilot models of both offset and direct connected types; either reducing or back pressure regulators, affording many different combinations in assembly. Standard sizes—from the straight 2", 3", 4" . . . up to 10" . . . will be available; the smallest orifice throat being 1¼" in diameter. These regulators are designated as the high pressure type of units. The only differentiation for low pressure construction is where semi-low or low-pressure enclosed dead weight diaphragm head exists and where bearing pins are installed so as to give a 3.4 to 1 lever pressure, as compared with pin installations in the center hole to produce a 1 to 1 power ratio for the high pressure units. Change from high to low pressure service is easily effected.

A special stabilizer which is part of the standard new regular equipment prevents surging and pulsation. The offset types have the rocker arm equipped with oilite bushings and stainless steel rockers, so designed and adjusted as to prevent any lost play in movement.

Offset type units connected on the 1 to 1 power ratio, have the same power as the direct connected units, and have the further advantage of quick accessibility to the valve mechanism through a hand-hole plate. All the mechanism is speedily removable through the top. Valve stem, valves, cage, etc., may be removed as a single unit, and, if new valve seats are needed, the complete assembly can be sent to the repair shop while a spare assembly replaces the original unit.



Any of the high pressure regulators can be equipped with 7", 9" or 11" diaphragm head. A 15" diaphragm head, which will handle lower pressures of from 6" to 2 pounds, also is obtainable. The low pressure dead weight head is capable of giving outlet pressures up to 12" of water, and the semi-low (with outside weight only) outlet pressures up to 42" of water.

Repair Sleeves That Save Interruptions of Service

Taking its cue from last winter's experience with sub-zero weather, epidemics of pipe breaks, the S. R. Dresser Manufacturing Company of Bradford, Pa., has announced special arrangements to meet an expected heavy demand for repair sleeves.

These sleeves, which permit full or partial service to be maintained while the repair is being made, are designed to effect a complete and permanent repair of any split, break or hole in any type of pipe line, in the shortest possible time. According to the manufacturers, it takes only a few minutes to enclose the broken pipe with a Dresser Split Sleeve—using only one tool, a wrench. It is not necessary to get a "dry" hole first; there are no joints to pour and calk; no waiting time; no idle crews.

The sleeves may even be installed under water, if necessary. Often a break can be fixed without shutting down service on the line.

The accompanying illustrations show how a typical break in a 4-inch water pipe was repaired with a Dresser Style 57 Split Sleeve. Two or more sleeves also can be joined together in a multiple installation to cover breaks that are longer than 8 inches. Dresser Split Sleeves are made in a number of different styles to fit various needs for pressures up to 500 lbs. per sq. in.

Increasing use of Dresser Split Sleeves during last winter's sub-zero weather has led to an unusually heavy pre-season demand this year. Special efforts have been made at the Dresser plant to build up extra inventories of all styles of repair sleeves, so that emergency orders can be filled without delay.

Here's how one 4-inch water main looked when the repair crew got down to it.

And here is the same pipe a few minutes later—the break now permanently repaired with a Dresser Style 57 Split Sleeve.

and Appliances

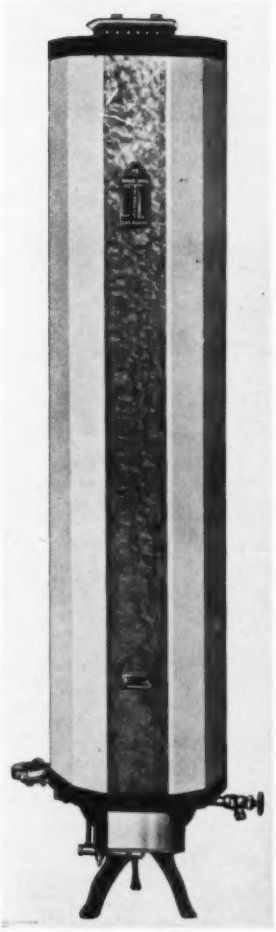
Handley Brown Gas Water Heaters

A new model of "Mirro-Shell" automatic gas water heater of modern design is shown in the adjoining cut. This unit, listed as model M.S. 30-8-A has 30 gallons capacity and is designed to supply up to 160 gallons of 90° rise hot water per household day.

Heat application combines radiation, reflection and absorption. Heat is generated by a small flame within the combustion chamber at the bottom of the heater. It is radiated through the walls of the burner box and the brass tubes carrying the products of combustion and is also reflected by a chromium plated metal surface through the walls of the broiler into the water.

Equipped with snap-action thermostat, safety pilot and low pressure regulator set for 3" water column pressure and insulated with corrugated asbestos and rock-wool, this heater is very attractive in design, finish and color. Size of the unit shown is 12" x 60". Gas input 10,000 B.T.U. per hour.

Manufactured by Handley Brown Heater Co., 209 E. Washington Ave., Jackson, Mich.



"Mirro-Shell" Water Heater
30 Gallon Capacity

New Models of Roper Gas Ranges

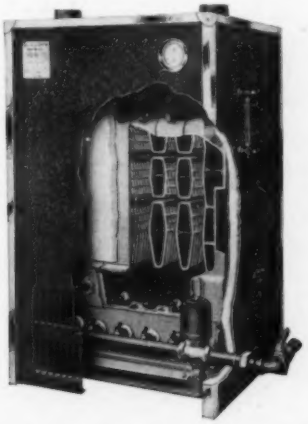
Geo. D. Roper Corporation, Rockford, Ill., in their latest catalog Z describes in considerable detail eleven of their 1937 models, featuring among others Type 3000—"The Commodore" and Type 800—"The Windsor."

Roper Range Type 3000.

The former type, shown in the illustration has one giant and three standard two-way "Multi-Flame" cast iron burners with center simmers and includes a low temperature oven burner which is a feature of all Roper 1937 models. Standard equipment of this model which has two lift-up, counterbalanced covers also includes enameled drip tray, oven heat control, timer alarm, special broilers, roll-out utility drawers and other attractive and useful features. Enameled cast iron legs support this welded steel model which comes in ivory or white enamel finish with green, black, Mandarin red or white handles. Other available features include electric time clock and automatic oven lighter and control. The model shown is 42" high by 41¾" long and 28" deep with four burner cooking top 20½" x 22½".

Burnham Gas Boilers

Equipped with dependable controls and thermostatic pilot the latest model of the Burnham-Simplex Gas



Boiler is shown herewith. This water tube design sets a high standard in absorbing heat per unit area of heating surface. Rust-resisting steel jacket backed with improved insulation has two-tone baked enamel finish. Manufactured by Burnham Boiler Corporation, Irvington, N. Y.

Industrial Division Meeting of New England Gas Association

UNDER the auspices of the New England Gas Association, an all-day Industrial Session was held at Waterbury, Connecticut, on Friday, December 18th.

The previous evening, members attended a dinner which was attended by Industrial Gas men from the New England States.

On Friday morning, local plant inspections were arranged by Mr. W. W. Young, Jr., industrial gas engineer of the Waterbury office of the Connecticut Light & Power Co. The group met at the Hotel Elton there and left for the plant of the Tinsheet Metals Company. There they were shown small batch type bright annealing equipment, copper strip tinning and kindred gas equipment in operation.

Following this, the group went to the South Plant of the American Brass Company and inspected Gas-Fired Billet heaters. They also saw furnaces for annealing the so-called nickel silver in the form of tubing as well as continuous bright annealing of copper tubing where the atmosphere consists of the products of combustion.

Punctually at 12:15 luncheon was served to the members in the Colonial Room of the Elton Hotel. The attendance was exceedingly good—every one of three large tables being occupied. Each of the principal gas companies having industrial departments in Connecticut as well as those in Massachusetts were present, including Hartford, Bridgeport, New Haven, Waterbury, Meriden, New Britain, Derby, Springfield, Worcester, as well as other well-known points. The Industrial Manufacturers were also well represented by their local engineer-salesmen. Altogether, some half a hundred attended.

After luncheon, the meeting adjourned to the new gas operated air-conditioned auditorium on the ground floor of the district offices of the Connecticut Light & Power Co. Three informal addresses were then delivered, followed by discussions.

The first address was given by Mr. Henry Keshian, the steel metallurgist of the Chase Companies of Waterbury, Conn., the subject being, "The Relative Merits of Gas, Electricity, and the Vapofier in the Modern Hardening Room." Mr. Keshian's introduction was largely devoted to a plea for what he considered the more important factors in the sale and adoption of any furnace equipment. Mr. Keshian deplored two things—exaggeration and generalization in industrial advertising and selling methods. He deemed it unfortunate that these things persisted to so great an extent. "The technical man," he said, "will stick to scientific principles." He recited instances where furnace literature dwelt on many "sales points," and excluded vital factors which he said he had found of far greater importance. He specifically named cases where the advertiser referred to such points as Cost, Quality, Flexibility, Quick Heating, Convenience, Low Cost, Efficiency, Heat Control, and so forth—some ten items in all—but where, as he put it, "there was not a word in regard to Comfort of the Operator and Safeguards for Health."

Mr. Keshian stated that in order, in his opinion, for there to be a logical basis for the determination of the right heating medium or furnace or both, every factor should be taken into consideration. For this reason he had decided on a method which took into account each point or factor of desirability whereby he arrived at a common denominator based on 100% for each item in a perfect case and then assigned percentages for each of the items making up the total.

He explained at some length that this was derived from many years of experience with every heating medium. For instance, he said, the Heat Treating Department was organized in the Waterbury Manufacturing Co., some 18 years ago when they began with 9 furnaces—all electric—of which the largest was 45 or 50 kw, down to small units. Since that time their choice had been far from haphazard and had embraced electric, gas and oil furnaces.

Early in their experience they found that apart from any personal preference, location had much to do with their selection. For example, whereas the Waterbury Mfg. Co., shop had perforce to be on the 4th floor, the Chase Metal Works shop was located in a basement. They had found that oil was out of the question on the 4th floor—thus eliminating one medium. On the other hand, the basement shop could, if desired, use any of the media. Again, types of work was a factor. On the one hand the Waterbury Mfg. plant treated small tools in small lots. On the other hand the Chase Metal Works shop treated large ones and very many of them. In effect, the smaller shop handled, perhaps 45,000 fine tools, requiring great accuracy, a year, and the larger one, many heavy ones, running almost to a production basis, of 10,000 to 15,000 a week.

Obviously, said Mr. Keshian, it was necessary to take into account local conditions in deciding which fuel or medium of heat to use and the style of furnace to adopt. He described his experience with oil in the vapofier type of unit and how they had decided that they would have to depart somewhat from the recommended method of operation, the renewal of cast iron pots or bowls being an item for their consideration and went into detail as to how they had proceeded, in order to show that they were well acquainted with each heating agent.

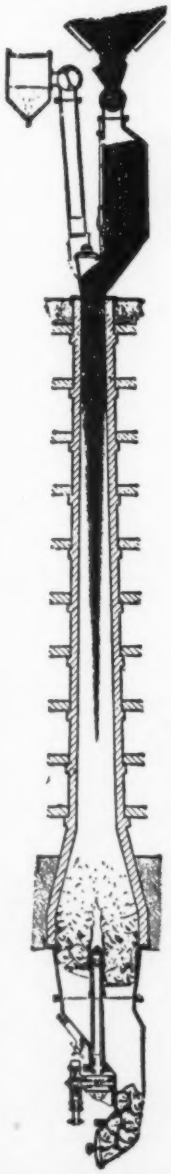
As a result, he said, they had set down some ten items as determining factors in fuel and furnace selection for each location and set of conditions. These included Convenience of Installation, Convenience in Handling, First Cost, Cost of Operation, Maintenance, Uniformity, Scale, Decarburization, Comfort, Health and so on.

Against each item they arrived at a percentage figure. These were then aggregated and a final figure was determined upon.

The speaker was careful to point out that local conditions would alter a decision from what would be the case in one place to what would be the effect in another. But his argument was to the view that selection should not be based on any haphazard reasoning or lack of it, but that a really scientific basis of determination of such a plan was essential if the result was to mean anything.

During the discussion which followed questions were asked as to how his percentages were arrived at and some interesting experiences

GLOVER-WEST
Vertical Retort System
Provides Maximum Production in Minimum Space



Uniform Production
Quantity per ton of coal and Quality of Gas are Constant

Flexible Output
Can be operated from 50% to full capacity

Thermal Efficiency
Sensible heat of out-going coke absorbed within the bench. No quenching necessary

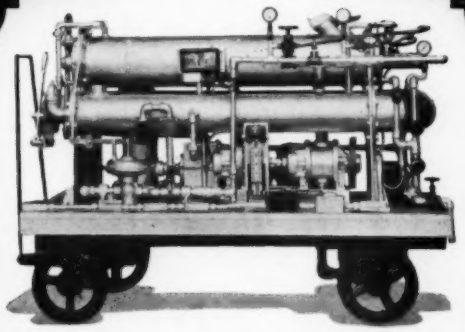
Naphthalene
With this equipment naphthalene scrubbers are not necessary

Operation and Maintenance
Correct design and rugged construction obviate the need of much costly auxiliary equipment

Nearly 400 plants now in successful operation in all parts of the world attest to the economic advantages of Glover-West Retorts.

West Gas Improvement Company
Engineers—Builders
424 Madison Ave. *New York, N. Y.*

$N+CO_2$
INERT GAS
produced in any volume
1,000 to 80,000 cu. ft. per hour



The economy and convenience of producing $N+CO_2$ Gas with an "R-C" Harrison Inert Gas Machine is now available for a wide range of applications, portable or stationary.

Capacities range from 1,000 to 80,000 cu.ft. per hour. Natural or manufactured gas, or fuel oil, may be used. The gas produced contains less than 1% Oxygen, with zero Carbon Monoxide.

Our engineers will gladly make specific suggestions for the application of this equipment to your processing or purging requirements.

Roots
CONNERSVILLE
BLOWER CORP.
CONNERSVILLE, INDIANA

TOMORROW'S ENGINEERING APPROVED BY YESTERDAY'S EXPERIENCE

were related by industrial engineers as to the most satisfactory uniformity in gas-fired heat treating furnaces against radiant heat streaks from electric heating resulting in buckling and warping which was completely eliminated by the use of gas as a medium of heat when properly fired.

Warm thanks were accorded Mr. Keshian for his talk.

This was followed by a talk by Mr. Henry Robinson, Furnace Engineer of the American Brass Company, whose plant was visited in the morning. This was a "Discussion of Equipment Seen on the Inspection Trips."

Mr. Robinson, who has had a wide experience from both the theoretically technical and practical angles of the heat treating profession, began by stating that many factors had influenced him in his selections of heating media.

He observed that gas companies had lately put into effect further important rate reductions and looking back on what they had paid in the past as well as forward in the direction they were going, it seemed obvious that gas costs were diminishing—whereas on the other hand, oil costs were headed upwards.

In this connection he cited the action of Congress in having taxed gasoline, and he deemed it well within the bounds of possibility that something similar might happen to fuel oil.

In other words, apart from anything else, he said—speaking personally—he would rather buy a fuel which was on a decreasing price scale, than a fuel which bore all the earmarks of ascending in the price range.

But distinctly uppermost in his mind was the fact that oil was too vital a fuel to be wasted. He deemed it a national danger to employ it where something was ready to take its place, and to do so readily with such useful attributes, such as ease of control and so forth. In short, as the speaker put it, oil formed one of the "sinews of war" and we would be lacking in duty were we to permit its being squandered.

He then reiterated the details of the furnace operations viewed in the morning. This mainly concerned billet heating. He stated that the one furnace was satisfactorily operated with an excess of raw gas on a basis of 250,000 lbs., at 925 cu. ft. per 1,000 lbs. of metal heated. It was explained that manual control had proved, in this case, to be best, due to conditions of work.

On the alloy containing nickel the front end was operated at 1000° C. with 850° C. at the loading end. Their figures were based on a single shift of 8 hours running something over 100,000 lbs. and then shut down. Their figures showed 1325 cu. ft. per 1000 lbs. of metal.

On the tube mill the average on 24 hours gave 630 lbs. per hour. This treated, mainly the so-called ¾" water tube. Their capacity could go to 1200 lbs. per hour or possibly 1400.

The speaker pointed out that although there were exceptions to the rule, yet in going through the table of atomic weights it had been found that metals with an atomic weight below 54 were difficult to bright anneal. Such are aluminum, chromium and so forth, but in their regular run they had had very good results.

The talk was ended with a discussion and hearty thanks to Mr. Henry Robinson.

The last talk was delivered by Mr. Sherman Knapp, air conditioning engineer of the Connecticut Light & Power Company on "Air Conditioning With the Kathabar."

In his talk, Mr. Knapp showed, on the screen, a diagrammatic arrangement of the air conditioning equipment used for the installation at the C. L. & P. Waterbury auditorium. He explained in detail the functions of each item which unfortunately space does not permit of reproduction. In the discussion Mr. Knapp was kind enough to answer numerous questions after he had delivered his address, embracing the use of lithium chloride, and numerous other points.

Trade Literature

Robertshaw Thermostat Co., Youngwood, Pa. Bulletin illustrating and describing space heater thermostats for automatic sectional house heating. Also contains diagrams showing how to make installations.

American Radiator Co., New York, N. Y. A four-page illustrated folder describing Arco enclosures for connection radiators in apartment houses. Illustrations show various sizes installed.

International Nickel Co., New York, N. Y. Bulletin C-5, titled "Monel and Nickel in Gas Works". It describes in a semi-technical way the uses of monel and other high nickel alloys to defeat corrosion. It contains a large amount of valuable data material with many illustrations.

Manganese Steel Forge Co., Philadelphia, Pa. Bulletin R-1 describing "Rol-Man" manganese steel for plate, wire and rod products. It tells about its high abrasion resistance, strength and toughness, and contains a complete list of parts fabricated from this material. It also contains a chapter on welding rod.

Fairbanks, Morse & Co., Chicago, Ill. A leaflet describing the Fairbanks dial scale and printomatic weigher. The weight of each car of coal is automatically printed on a roll of tape.

The Brown Instrument Co. division of Minneapolis-Honeywell Regulator Co., at Philadelphia issues catalog 8901 describing Brown "Air-O-Line" controllers for temperature, pressure, flow and liquid level. Fundamentals and details of construction are fully described and attractively illustrated with photos and diagrams.

A brief synopsis of the products and activities of the Kopper Company is colorfully described in a bulletin which has for a center spread a diagram of a coke and by-product plant with a flow sheet of products and their industrial application. Announcement accompanying the bulletin that hereafter all products formerly marketed by Koppers Products Co. will be handled by Koppers Company—Tar and Chemical Division.

"Cooper-Bessemer Type-EN Gas Engines" is the title of a new bulletin just issued by The Cooper-Bessemer Corporation, of Mount Vernon, Ohio.

The Type EN is rated 30 to 38 hp. per cylinder and is built in 3, 4, 6 and 8 cylinders. It is one of the popular "N-Line" series. Chief features are conversion to Diesel operation; compact design; inexpensive installation; and reduced costs of operation and maintenance.

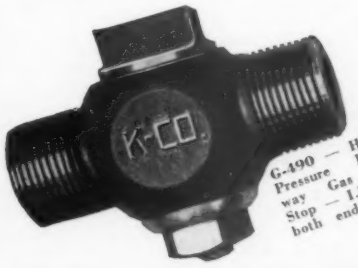
The bulletin points to the many industrial applications of these engines. Copy of the bulletin will be furnished by any of the Cooper-Bessemer offices, upon request.

C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y., have issued a new Oil Testing Instrument Catalog No. 699D. This book contains listings and descriptions, as well as technical information, on every oil testing instrument of importance, including thermometers, hydrometers, colorimeters, viscosimeters, flash and and fire test apparatus, distillation apparatus, etc. In addition will be found a listing of charts for determining viscosity-index, comparing viscosities at various temperatures, blending and determining gravity corrections.

SUPERIOR

Diaphrams
Provers
Repairs
Service Cleaners
Gas Meters

SUPERIOR METER CO.
Brooklyn, N. Y.
167 - 41st Street



G-490 — High Pressure Roundway Gas Main Stop — I.P. Male both ends.

GAS MAIN STOPS

— of the fine rugged quality and long enduring performance always inherent in products of

KITSON COMPANY
2409-15 Westmoreland St., Philadelphia, Pa.

G-491 — High Pressure Roundway Gas Main Stop — Male and Female.

The Outstanding Gas Purifying Material » » »

Highest H_2S removal combined with complete removal of traces. Physical structure insures very low box back pressures.

THE RECOGNIZED PURIFYING MATERIAL FOR VAPOR PHASE GUM CONTROL.

Ask for our new bulletins Nos. AL-18-19 which are very interesting

THE ALPHA-LUX COMPANY, Inc.
192 FRONT ST., NEW YORK
Philadelphia **Chicago**

House Heating With Gas Topic of Sales Conference

AN optimistic future for House Heating with gas was the keynote of the seventh annual meeting of the Metropolitan House Heating and Air Conditioning Council held December 16th at the Hotel Governor Clinton, New York. The registration at this meeting was the largest in the history of the council, which is comprised of House Heating engineers and salesmen in gas companies in the New York, New Jersey and Connecticut areas.

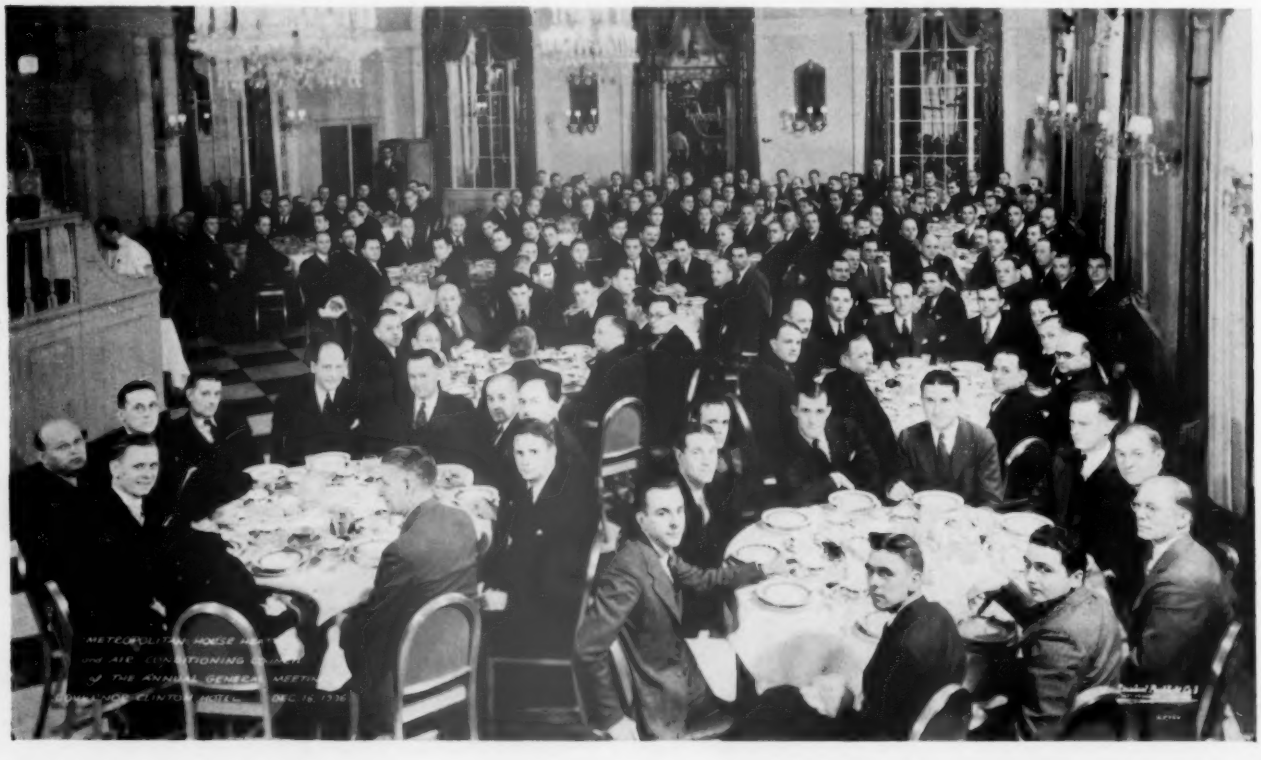
Mr. Howard S. Giez, a builder of Montclair, N. J., gave an outsider's viewpoint on the advantages of gas for househeating, stressing comfort, health, cleanliness, convenience, comparative depreciation costs and service charges. He pointed out that a closer cooperation with builders would help sell not only househeating equipment but other gas appliances. He predicted a big building boom and a bright future for gas househeating.

Another outsider's ideas were presented by R. K. Hart, Hart Air Conditioning Co., Union City, N. J. Mr. Hart urged closer dealer cooperation, education of brokers and realtors on advantages of gas heat, representation by gas companies on real estate developments during weekends, when more prospective buyers visit these homes, and that estimates include distribution costs.

Other instructive papers and discussions were presented by F. T. Head of Consolidated Edison Co., of N. Y., E. W. Brundage, Long Island Lighting Co., J. J. Deely, who explained the "Gas Load Package" including Househeating equipment, Water heater Range and Refrigerator, which they are now selling in Brooklyn Union territory. (This same idea is described in R. J. Rutherford's paper printed elsewhere in this issue). J. P. Leinroth, Public Service E. & G. Corp. of Newark urged gas heating men to take an offensive or affirmative attitude not a defensive or negative one. Instead of working only to hold business but to get out after new installations. N. T. Sellman, Consolidated Edison of New York, predicted a 100% increase in househeating in 1937 over 1936 and stressed the need of specialized training and knowledge.

A very instructive yet entertaining film entitled "That's What You Think" used by the Consolidated Edison Co., of New York to sell their Sales staff on househeating with gas was shown, after which there was a symposium by several salesmen on "That's What We Think."

A description of the Waukesha Engine by Mr. Alva Palmer, Brooklyn Union Gas Co., was the final paper presented.



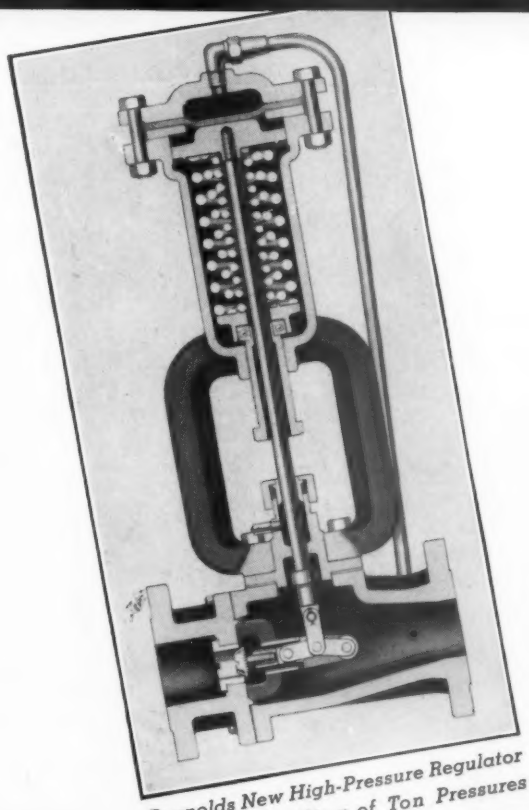
R. H. Maurer Vice President of Wilcolator Co.

The Wilcolator Company of Newark, New Jersey, announces that Mr. Rufus H. Maurer has been appointed a vice-president of the company.

Mr. Maurer is well known in the temperature control industry, having been closely identified with the gas industry for many years. As one of the original members of the Utilization Department of the Consolidated Gas Company of New York, and as illuminating engineer, he was special representative to the Illuminating Engineering Society as well as a member of the Society of Gas Engineers of New York City and the American Gas Association. When president of the Automatic Safety Pilot Corporation of New York he was the builder of the first safety pilot for gas appliances in this country.

Mr. Maurer will make his headquarters in Chicago to handle the sale of Wilcolator products in the Middle Western district.

HIGH PRESSURE



Reynolds New High-Pressure Regulator for Safe Handling of Ton Pressures

SAFE AT A TON

REYNOLDS High Pressure Regulators for pressures of one ton on down provide ample safety factors. These factors, an all-important consideration in every high-pressure installation, are factory proven through a range of operating conditions more rigid than those met ordinarily in routine operation. Write for details.

BRANCH OFFICES:
421 Dwight Building
Kansas City, Missouri
2nd Unit, Santa Fe Bldg.
Dallas, Texas

REPRESENTATIVES:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry
Avon, New Jersey

GAS CONTROL SINCE 1892

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

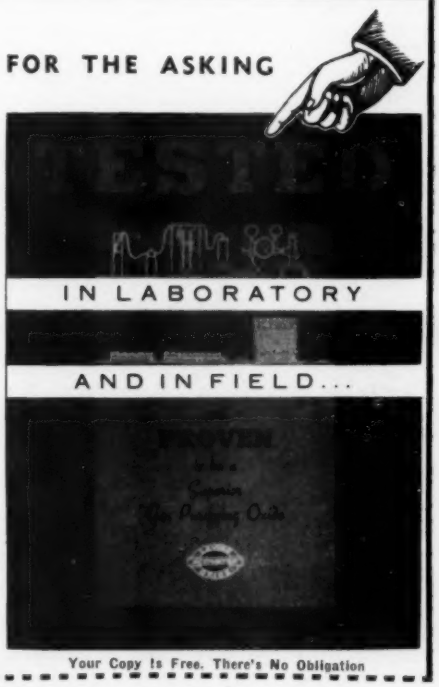
ANDALE COMPANY
1600 ARCH STREET
PHILADELPHIA

Yours FOR THE ASKING

an authoritative PAMPHLET giving detailed results of an independent investigation of

LAVINO "ACTIVATED" OXIDE

and containing Facts and Figures significant to you.



FILL IN AND MAIL THIS COUPON

Your Copy Is Free. There's No Obligation

E. J. LAVINO and CO., 1528 Walnut St., Phila., Pa.

Yes, send me my copy of your new pamphlet.

Name ..... Position .....
Company .....
Address .....

Paul D. Warren Retires

After more than 41 years of service with The Peoples Gas Light and Coke Company, Paul D. Warren, Assistant to the Vice President of Sales, and the first superintendent of the first Home Service department in the country, retired on January 1.

From the start of his gas company career in Chicago, on July 5, 1895, Mr. Warren's ability and workable ideas attracted attention, and after a few years of "apprenticeship" he was made manager of the company's first Addressograph department. Thereafter he rose from one supervisory and executive position to another, being appointed to head the company's Stationery, Application, and Bookkeeping departments.

Mr. Warren was appointed Superintendent of the Home Service department, and assistant to the Vice president in Charge of Sales on June 2, 1924. This was at a time when the spark of the Home Service idea was first set off; it was beginning to be accepted as a method of offsetting conditions that were forming as an aftermath of the world war, when new generations of housewives were growing up and getting married, without the inclination and skill to deal adequately with dining room and kitchen problems. Mr. Warren was the first executive organizer of this highly important addition to the gas industry.

For many years during his career, Mr. Warren engaged in gas association work. In 1927 and '28 he was President of the Illinois Gas Association. He has also been active in American Gas Association work, serving as chairman of numerous committees in the Accounting and Commercial sections. For three consecutive years he had charge of the Accounting section exhibits at Atlantic City. He has also been Vice Chairman and Chairman of the Home Service committee of the association.

S. Lewis Tucker, Jr. Dies

S. Lewis Tucker, Jr., Controller of American Meter Company, New York, died at the New Rochelle Hospital of a nose infection on Friday, December 18, after a brief illness of 5 days.

Mr. Tucker was born in Woodbury, N. J., and was 38 years old. He graduated from the University of Pennsylvania and was a member of the Pennsylvania Institute of Certified Public Accountants. His widow, three daughters and a son, his father and four sisters survive.

After ten years with Edw. P. Moxey & Company of Philadelphia, Mr. Tucker joined the Treasurer's Office of American Meter Company on March 1, 1930, and advanced rapidly because of his ability. From the position of Accountant of the company he was appointed Controller on January 1, 1935. He conducted this office with great success.

CONVENTION CALENDAR

January

25-27—American Society of Heating & Ventilating Engrs., Hotel Statler, St. Louis, Mo.

February

10-12—Southern Gas Association, Southwest Regional Gas Sales Conference, Peabody Hotel, Memphis, Tenn.

10-12—New England Gas Association, Hotel Statler, Boston, Mass.

March

2- 3—American Gas Association, Industrial Gas Section, General Commercial and Hotel and Restaurant Sales Conference, Philadelphia, Pa.

4- 6—Penn. Gas Association, Skytop Lodge, Skytop, Pa.

10-15—Natural Gas Department, American Gas Association, Civic Auditorium, Kansas City, Mo.

June

8- 9—American Gas Assn., Industrial Gas Section, Industrial Gas Sales Conference, Chicago, Ill.

Mathews with Public Utility Eng. & Service Corp.

H. O. Mathews has been appointed automotive engineer of Public Utility Engineering and Service Corporation, to succeed L. V. Newton, who several months ago was elected vice president in charge of operation of Market Street Railway Company in San Francisco.

Mr. Mathews' association with Public Utility Engineering and Service Corporation became effective December 1, 1936.

Willis H. Carrier Honored for Development of Air Conditioning Law

Willis H. Carrier, past president of the American Society of Heating and Ventilating Engineers, has been voted an honorary member of the Japanese Association of Refrigeration according to a cablegram received by the society from Dr. Masao Kamo, professor of mechanical engineering, of the Imperial University, Tokyo, and president of the Japanese association. The honor was conferred in recognition of the twenty-fifth anniversary of Mr. Carrier's presentation of the psychometric formulae on which the art of air conditioning is generally considered to rest.

Geo. D. Roper Corp. Expand Activities for 1937

Supplementing the national advertising program of the American Gas Association, George D. Roper Corporation of Rockford, Ill., will carry individual advertising space in several popular magazines including *House and Garden, House Beautiful* and *Better Homes and Gardens.* They also augment their sales personnel with the following representatives; P. T. Strout and L. L. Door of the Universal Appliance Co. of Boston for the New England territory, A. F. Jenkins in the New York district, Sam Du Bose in Atlanta, Sam L. Barnes for northern Illinois and A. N. Richards in Oklahoma under the supervision of R. T. Bergh mid-west representative.

Foxboro Adds to Field Personnel

Walter N. Stancati has joined the staff of the Pittsburgh office of The Foxboro Company, Foxboro, Mass., makers of industrial precision instruments. Mr. Stancati will work out of Pittsburgh as a Sales Engineer. Frank H. Herman has been added to the personnel in the repair shops of Foxboro's Pittsburgh office.

Roger W. Allen has been appointed as Sales Engineer in the Atlanta, Georgia, office of The Foxboro Company.

T. R. Smiley has been added to the personnel in the repair shops of the San Francisco office.

R. C. Guthrie, Chairman Ferrous Metals Com., Industrial Sec. A. G. A.

Robert G. Guthrie, past president of the American Society for Metals, and consulting metallurgist for The Peoples Gas Light and Coke Company, Chicago, has been appointed chairman of the Ferrous Metals Committee of the Industrial Gas Section of the American Gas Association, according to an announcement by Ralph L. Manier of Syracuse, who is chairman of the Industrial Gas Section. Mr. Guthrie is one of the country's most widely known metallurgists and has developed among other things extremely delicate methods for taking photomicrographs, and has made many improvements in the application and conservation of heat in metallurgical processes.

The Cooper-Bessemer Corporation of Mt. Vernon, Ohio, has issued Bulletin 309 describing Type GN, gas engines of 3, 4, 6 and 8 cylinders, rated at 50 to 60 hp. per cylinder. "It is easy to see," the bulletin relates, "why Diesel-type construction in every piece and part makes a huskier and longer-lived gas engine. All main parts of the Type GN are heavier and stronger than those of other vertical gas engines with a similar power rating. Yet, excessive weight is avoided by the use of modern materials." The Type GN gas engine can be converted at any time to a strictly modern Diesel. Copies of the bulletin describing it can be obtained by writing to any of the Cooper-Bessemer offices.

Every Range Salesman Needs This Ammunition!

Domestic Gas Ranges

by

Charles W. Merriam, Jr.

Partial Table of Contents

Relative Merits of different fuels
Types of Ranges
Console vs. Table Top
Construction Materials
Oven Types
Temperature Control
Insulation
Automatic Oven Lighting
Types of Burners
Comparative Efficiencies
Flexible Control
Fuel Economy
Relative Costs of Gas vs. Electricity
Burner Arrangements
Retail Prices
Appendix:—Useful Tables

- A handy and informative volume filled with authoritative information on types, characteristics, design, operation, heat control and advantages of the modern gas range.
- A reference book of great value to every range salesman and sales-manager.
- An invaluable manual for sales department study and discussion groups.
- Eighty pages of the real essence of range construction and operation.
- Size 6" x 9", durable paper cover. Price $1.00. Discount on Quantities. Order your copies now.

Ready for Delivery Jan. 15th

AMERICAN GAS JOURNAL
53 Park Place New York

AMERICAN GAS JOURNAL
53 Park Place, N. Y.

Send .....copies of Domestic Gas Ranges with invoice to

NAME .....

ADDRESS .....

The James F. Lincoln Arc Welding Foundation

Spurred by a dual desire to stimulate scientific development in the arc welding field, and to honor the pioneer work of its president in promoting arc welding and perfecting and developing arc welding equipment and electrodes, The Lincoln Electric Company has just completed its long contemplated plans for establishing a Fund and Foundation to encourage study and research for benefit of the industry.

This new fund, which was voted by directors of the company at the turn of the year, has been named "The James F. Lincoln Arc Welding Foundation". Objects of the Foundation, and the significance of its name, are best set forth in the inaugurating resolution just adopted by The Lincoln Electric Company's board. This states in part:

"Whereas, it is desired in the public interest that careful and extensive scientific study, research and education in respect of development of the arc welding industry be encouraged; and

"Whereas, the comparatively recent developments of electric arc welding disclose a vast field of study and research which yet is in its infancy . . .; and

"Whereas, through such study and research, the public and modern industry should have the benefit of accurate knowledge and information in matters affecting the application of electric arc welding to machinery and equipment; and

"Whereas, it is the desire of this Company to assist in furthering said objects and to provide suitable rewards therefore;

"Now, therefore, be it resolved that The Lincoln Electric Company should, and it does hereby, found, create and establish for such purpose, a scientific educational Fund and Foundation, which shall be organized and operated exclusively for the purposes as set forth in this resolution; and further, as a token of its esteem and respect for James F. Lincoln, and for his wide experience and interests in said scientific subjects, it denominates such as 'The James F. Lincoln Arc Welding Foundation'."

James F. Lincoln

Principal direction of the Fundation's work will be given by Dr. E. E. Dreese, Chairman of the Department of Electrical Engineering of The Ohio State University.

Other trustees who will serve with Dr. Dreese on the Foundation are W. B. Stewart, distinguished member of the Cleveland Bar, and H. R. Harris, Vice-President of the Central United Band of Cleveland.

Acceptance by Dr. Dreese of his important position with the Foundation places its program on the highest possible plane, and assures the carrying out of studies which will view arc welding with full regard to both its economic and social significance.

After receiving the second electrical engineering Doctorate Degree ever given by the University of Michigan, in 1929, Dr. Dreese was appointed Professor of Electrical Engineering at The Ohio State University, and in February, 1930, was made Chairman of the Department.

He is author of numerous papers presented before the American Institute of Electrical Engineers, of which he is an outstanding member. His other connections with the field of science include membership in The Society for Promotion of Engineering Education, and in Tau Beta Pi, Sigma Xi and Eta Kappa Nu honorary fraternities.

Commenting on the honor just bestowed upon him, President James F. Lincoln states:

"The world is just becoming aware of the rise of a new industrial process which holds economic and social significance of the highest order.

"In laboratory and in mill and factory the world around, scientists and technicians are seeking to develop new phases of the electric arc as a superior welding technic.

"Already, their persistent pioneering has brought forth amazing results. With the aid of the electric arc, many industrial methods, together with new processes of incalculable benefit, have been made commonly available.

"Yet, so recent is the development of arc welding as a practical process, its full benefits have been experienced by not more than one in five potential users.

"It is indisputably a fact that every manufacturer, every engineer, every merchant and every consumer of virtually every product now made has a vital interest in further development of the arc welding process—in speeding the widest possible acceptance of this comparatively new method which produces so much better for so much less.

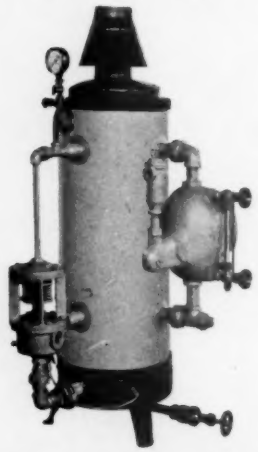
"As a consequence, I feel signally honored in having my name attached to a Foundation which will seek to help the arc welding industry improve and extend its benefit.

"The sole purpose of this new Foundation is to challenge the attention of manufacturers whose products benefit society; and to stimulate the ingenuity of every engineer and skilled worker interested in extending the frontiers of knowledge and achievement.

"This arousing of interest through the Foundation will result, I believe, in lower production costs for thousands of devices and commodities now employed in manufacture or moving in commerce, and will give constantly increasing markets the benefit of better, stronger and more serviceable goods."

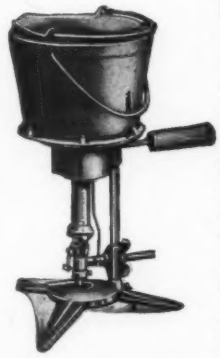
It is expected that directors of the Foundation will complete their organization of a comprehensive program at an early date, and that the Foundation will announce the first of its activities by the close of this month.

INDUSTRIAL GAS BOILERS
Tubular or Flueless
¾ to 45 H.P.



P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

JOHNSON NO. 8 ADJUSTABLE TORCH AND MELTING POT



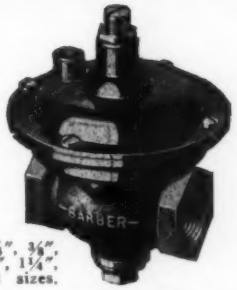
Here's an outstanding Torch and Melting Pot unit that is widely used and highly popular. It is portable, fast acting, efficient, and is adaptable to a large variety of shop and laboratory uses. Ideal for melting such soft metals as lead, babbitt, solder, zinc or tin. Pot and shield can be instantly removed and the powerful Johnson burner applied to soldering, tempering, or any pre-heating work. The burner is adjustable to any angle or can be removed and used as an efficient hand torch. Write for full details.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Western Representative:
C. B. BABCOCK CO.
135 Bluxome Street
San Francisco, Calif.

Eastern Representative:
J. H. McPHERSON
250 Stuart Street
Boston, Mass.

You Get DEPENDABILITY in a Gas Pressure
REGULATOR
Built By
BARBER



Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2 sizes.

If there is any place in the world where a cheap product is ill-advised—it's in the case of Gas Pressure Regulators. Barber Regulators have A.G.A. Approval, complying with severe requirements as to pressure drop and precision of operation. Moderately priced for Regulators of the highest grade. Compact design, all-bronze bodies, accurate workmanship and assembly—gas-tested and inspected. These qualities ARE essential for Regulators you can install—and FORGET.

Write for literature, prices and discounts on the Barber line of Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.,
3704 Superior Avenue, Cleveland, Ohio
The Barber Gas Burner Co. of Michigan
4475 Cass Avenue Detroit, Michigan

"Using **CHACE** *Thermostatic* **BIMETAL** *Exclusively* IN THE **Coleman** WAFFLE MAKERS"

MADE BY THE COLEMAN LAMP & STOVE COMPANY WICHITA, KANSAS

Chace Thermostatic Bimetal is the active element built into Coleman Waffle Makers which helps maintain correct baking temperature and automatically prevents overheating.

In the electrical industry, in the gas burning field, and in every other business where a positive, automatic action or movement is desired at a given temperature—specify "Chace". Sold in sheet, in strips, and shaped ready for assembly.

W. M. CHACE CO.
1610 Beard Avenue - - - Detroit Mich.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS
FOR
ALL MAKES — ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— 0 —

LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

The Economics of Energy Distribution

(Continued from page 40)

type water heaters, 35% of which were outright sales and 65% rentals.

Please bear in mind that 12% of our customers were using automatic storage type water heaters when this activity started."

Also the results of the gas company at Atlanta, Ga. in the heart of the T.V.A. activity are most interesting, as follows:

1. During a recent campaign they sold 3256 gas ranges or 4½% of their meters and 7½% of these ranges replaced electric ranges.

2. In their territory where gas is available, the total electric ranges is but 2% and they quote as follows—"Instead of worrying over power company competition, the company concentrated its selling attack and the results dispelled the bugaboo of electric competition."

When this can happen in the shadow of T.V.A. and in much heralded "Georgia Power" territory, it should be indeed encouraging to us in the gas industry that "right eventually is might."

At this point perhaps a word or two should be said with reference to the rate of growth of the gas industry over the past two or three years. Some view the lack of substantial increases with alarm and others, mainly outside the industry, are prone to view it as an indication of the "horse and buggy theory."

Let us look at the record for a few facts. According to statistics, the commercial and industrial business of the manufactured gas industry has increased in every year of the depression at a greater rate than the same figures for the electric industry and at the present time (year 1935) the commercial and industrial load of the manufactured gas industry is 95.2% of the 1929 peak, as compared with 96.7% for the electric. When the gas industry of the country is considered, including natural gas, the commercial and industrial is 103.8% of the 1929 peak.

This last year we have heard much of the big increases in electric loads throughout the country. It will interest you to know that for the year 1935 the increase over 1934 in commercial and industrial gas by the manufactured gas industry of the country is over 11½% and slightly over 12% in the natural gas industry, as compared with a 9% increase for similar classification in the electric industry.

The reason that our total gas load increase is not as great as the electric is because the commercial and industrial business of our industry represents only one-third of our business as compared with two-thirds in the electric industry.

The domestic load of the gas industry, exclusive of house heating, has not shown substantial increases recently, which may at first be viewed with alarm, since it generally represents two-thirds of our business. The house heating increases have generally tended to more than offset the decline in domestic use so that our total domestic load is holding its own. In fact, the total gas business of the country at the present time is close to the all time 1929 peak end at the low point in the depression only reached 85% of its peak. When it is realized that in this period we faced a tremendous decline in economic conditions, the like of which we have never seen before, coupled with a flood of oil and other forms of energy, as well as increased use of more efficient gas utilizing equipment, the significance of these figures are apparent.

Close to 1929 Peak

The fact we are back close to the 1929 peak, in view of these conditions, is testimony to the fundamental correctness of our business. If we are a relic of the "horse and buggy days" we may paraphrase by saying these are "gas buggy days" which we know in the automobile is probably the greatest single force in our present economic system of society and therefore a "good buggy" to be in.

Let us consider the domestic end of our business, exclusive of house heating, which has disturbed some of us, since the electric domestic loads seem to be showing substantial increases in the last year. We must bear in mind that we have been supplying a pretty well saturated market and one whose amount of energy in the average home is ten times that of the electric uses in that same home. A small added load to the electric lines has a definite effect. In other words, double nothing is still nothing. A refrigerator added to an electric home will double the average consumption. To have any appreciable effect on our domestic load requires substantial amounts of energy. On the other hand, we are selling and developing more efficient ranges and water heaters which are bound to have a shrinking effect on our domestic load. But it must not be viewed with alarm; it is the means for holding and still further developing our business, as the purchasing power of our country increases and improved standards of living increase hot water requirements. Except for that increase we should expect our domestic load, exclusive of house heating and refrigeration to stay still. There is only so much juice in an orange. We should, however, guard carefully this more or less saturated market, as it is the backbone which enables us to carry on our house heating business on a sound economic basis which eventually will be of benefit to the customer and company alike.

It is for these reasons that it is important that we counteract with all possible effort any tendency to lose this domestic load to competing forms of energy. In view of the forces that are about us, it is essential that we be unusually aggressive in the domestic appliance field, even though we do not as a result show any substantial load increases, since such modern equipment in the customers' home does not leave them to fall easy prey to other fuels who view this business with longing eyes.

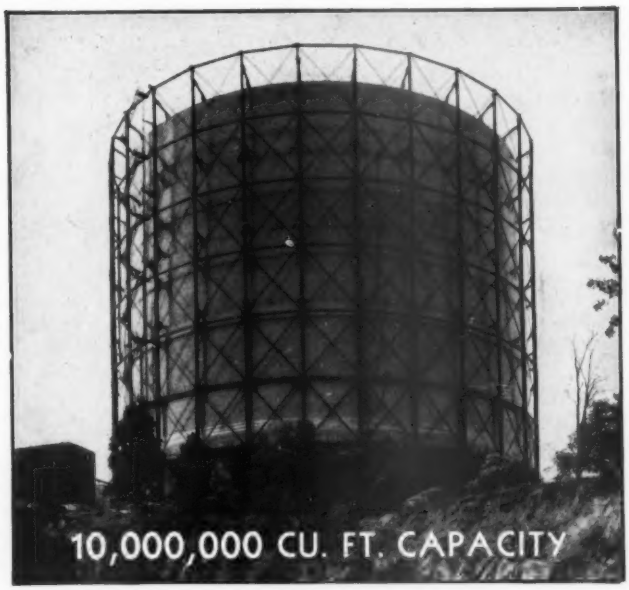
Even in the more or less saturated domestic market active attack will accomplish results. We have been interested to follow the results in a residential community, the gas operation of which we took over two years ago. The electric service in this town is supplied by a large, aggressive organization with low electric rates of a highly promotional nature, which as a result had built up considerable of a market in electric ranges and refrigerators. We were very anxious to see what we could do with some sales minded activity and promotional rates in a gas territory that had been more or less neglected with the following results.

In this community of 904 meters, we have sold 296 automatic water heaters, 53 refrigerators and 86 ranges, or 33.0% of the meters with water heaters, 5.9% with ranges and 9.5% with refrigerators.

Twenty-six per cent of the ranges replaced electric ranges, and 14% of the refrigerators replaced electric refrigerators and "the end is not yet."

The revenues from operations have increased 25%, the gas sales

(Continued on page 60)



HIGH PRESSURE **GAS HOLDERS** LOW PRESSURE

PURIFIERS · TANKS · CONDENSERS

STEEL PLATE CONSTRUCTION

INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.

AMBLER, PA.

A Safeguard on the Vapor Lines

Fulton Duplex Vacuum Regulator

CF

WHEN used in vapor lines connected to storage tanks, for the recovery of gases, the Fulton Duplex Vacuum Regulator will prevent the pulling of a vacuum in the storage tank. When the pressure in the storage tank has been released by removal of gases, the regulator will close. It is so constructed that it cannot do otherwise. Its use affords a very definite safeguard on vapor lines. Write for Bulletin 2499.

The Chaplin-Fulton Mfg. Co.

28-40 Penn Ave. Pittsburgh, Pa.

New AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

Pressure relief is obtained through a spring-loaded valve which opens when the pressure reaches a predetermined point. Should the water become overheated to 200° F, a fusible disc melts and lets the water escape thereby preventing a further increase in temperature.

The Titan Relief Valve serves as a coupling connected in the line thereby eliminating the necessity and expense of a tee fitting.

To replace fusible disc, it is not necessary to disassemble valves or piping in any way.

Designed for application to storage or range boilers. Prevents corrosion, scalding and explosion.

Catalog and full information upon request.

The Titan Valve & Manufacturing Company

Thermostats • Safety Pilots • Relief Valves • Safetystats

9913 Elk Avenue Cleveland, Ohio

TITAN WATER HEATER CONTROLS

GAS SERVICE STOPS

SINCE 1869 Hays has built dependable brass products for the Gas Industry. Standard, Special Weight, Heavy Pattern and High Pressure Stops to meet all requirements are manufactured by Hays in a full range of sizes. Write for Catalog No. 4 today.

HAYS MANUFACTURING CO. ERIE, PA.

SPRAGUE

CAST IRON GAS METERS

and

REGULATORS

are standard equipment

the World over

Write for catalogs

THE SPRAGUE METER CO.

Bridgeport, Conn.

(Continued from page 58)

in cu. ft. have increased 70% and the net 33%. This is developed to show that we can do a lot if we play our cards right.

At the present time, the electric industry generally is in an orgy of appliance sales, especially in refrigeration, and in a few years, when they begin to wear out, it will be interesting to see the replacement business which our absence of moving parts should make available to us

Therefore, I think you will agree that we are fortunate in that we have little to cry about and considerable to be thankful for, and, if we miss the boat, it will be because we have let others less able beat us to it.

Probably the most astounding figure in Table 2, to the average individual, is the limited oil reserves of this country. This cry of a shortage of oil was once before broadcast shortly after the war, only to be followed by the discovery in East Texas and the mid-continent of the largest oil fields in the world.

The developments were largely the result of the post war developed geophysical methods of geological exploration, which enabled the study of structures heretofore impossible. This development has now had its day and during the past four years it is significant that new fields have been developed at a rate only approximately half the present rate of consumption. Therefore, the probability of this forecast being again upset is not as promising as may be felt by many.

The oil industry and motor fuel industry have no need of fear, however, since the recently developed hydrogenation processes in this country and abroad can make oil from coal at a cost slightly higher than present prices. However, this slight increase sooner or later to come is the shining light in our bright future, for it is bound to throw large quantities of business to the gas industry.

The fuel of the future in this country is coal and the gas industry is the most efficient means of conveying that energy to the ultimate consumer where heat is desired.

Conclusions

In summary, therefore, it would seem that our industry has a large part to play in the development of sound social economics and it is our duty to develop a consciousness of this fact and to bring all pertinent facts to the attention of the public, so that the program of recovery can be pointed in the right direction and avoid costly pitfalls.

We should seize every opportunity to dispel the "horse and buggy" insinuation that has been given to the gas industry by many of our well meaning social planners.

Probably one of our most valuable weapons is the proposed national advertising program of the American Gas Association.

We must remember that the cooking, waterheating and househeating fields are legitimately our business, and they are large users of energy, so that they appear like fertile fields indeed to other forms of energy.

We must remember that the salvation of these huge Government projects depends largely on being able to take a load rightfully ours, so we can well appreciate that we will have still greater emphasis played upon these programs, because of the political significance that they seem to develop in the minds of the uninitiated.

Furthermore, with the gigantic propaganda which large concerns such as General Electric and Westinghouse can carry on, we are facing a formidable set of circumstances.

Our defensive is to attack. We have no large industry to fight our battles for us. We must fight it alone. It is this reason which necessitates the advertising program now being developed by the American Gas Association.

We should press on in our program of the *all gas* kitchen, joyful in the knowledge that we are fostering that which is best for society as a whole.

To those of us in the gas industry, it cannot help but be inspiring to see how our industry fits into the basic economics of our country, particularly in the future. No man can put his heart into an endeavor in which he does not believe. Such inspiration sooner or later must make itself felt in the progress of the industry, as well as that of the country we are attempting to serve.

Legal Effect

(Continued from page 22)

The court refused to do so, and said:

"The facilities of a company being under the supervision of the Public Service Commission, it does not lie within the power of the court to direct the company to sever the connection it has with the pipe, for that would be an interruption of public service that would encroach upon what is undoubtedly the particular domain of the Commission. . . . If the plaintiff (Wright) is wronged in the present case through the exercise of any of the facilities employed by the company, he can file his complaint with the Commission."

Additional McCarter Certificate Awarded

Award of an additional certificate in connection with the McCarter Medal in recognition of assistance contributing to the successful application of the Schafer prone pressure method of resuscitation, was approved by the Executive Board of the American Gas Association at its meeting in New York, December 9.

This action was taken on recommendation of the Accident Prevention Committee and with the approval of Thomas N. McCarter, president of the Public Service Electric and Gas Company, Newark, N. J., donor of the McCarter Medals and Certificates. Such a certificate makes possible the recognition of a person who rescues a victim of asphyxiation but does not participate in the actual resuscitation.

Since the McCarter Medal was first established in 1923 through the generosity of Mr. McCarter, 545 men and women employed by the gas industry have been awarded this medal for saving a life; 28 have received bars for repeating the performance or saving a second life; two have saved three lives, and in recognition of repeated bravery, each has received a McCarter Medal and two bars, while 227 certificates have been awarded to those assisting in resuscitations by the prone pressure method.

In establishing the McCarter Medal, Mr. McCarter had two purposes in mind. The first was to provide suitable recognition for acts of heroism by members of the gas industry. The other was to stimulate interest in and a knowledge of the prone pressure method of resuscitation. The increasing number of applications and widespread interest in the awards is evidence that these purposes have been accomplished. It is expected that the establishment of this additional certificate will further stimulate interest in the prone pressure method of resuscitation.

Lincoln Electric Company Opens New Office In Chattanooga

The Lincoln Electric Company, Cleveland, Ohio, announces that Robert Daniels has been placed in charge of the Chattanooga, Tenn. office of the company located at 1015 Hanover Street.

Mr. Daniels has been associated with the Company in sales work since April, 1934. He is thoroughly schooled in the practical aspects of arc welding, having worked four years as a welder for the Chicago Bridge and Iron Works.

INDEX TO ADVERTISERS

Alpha Lux Co., The 51
American Meter Co. 9
Andale Company 53
Appalachian Coals, Inc. 3
Barber Gas Burner Co., The 57
Bartlett Hayward Division, Koppers Co. .. 4
Blaw-Knox Company 45
Cast Iron Pipe Research Assn., The..... 6
Chace Co., W. M. 57
Chaplin Fulton Mfg. Co., The..... 59
Connelly Iron Sponge & Governor Co...Back Cover
Cruse-Kemper Co. 59
Dresser Mfg. Co., S. R. 33
Handley-Brown Heater Co. 36
Hays Manufacturing Co. 59
Improved Equipment — Russell Engineering Corp. 61
Isbell Porter Co. 62
Johnson Gas Appliance Co. 57
Kitson Company 51
Koppers Co. .....Inside Front Cover
Lambert Meter Co., Inc. 57
Lattner Mfg. Co., P. M. 56
Lavino & Co., E. J. 53
Minneapolis Honeywell Regulator Co. Inside Back Cover
National Tube Co. 5
Pittsburgh-Equitable Meter Co. .....Front Cover
Pittsburgh Water Heater Co. 42
Phillips, Alfred I. 61
Remington Rand, Inc. 10
Reynolds Gas Regulator Co. 53
Robertshaw Thermostat Co. 27
Roots Connersville Blower Corp. 49
Safety Gas Main Stopper Co. Inc..... 61
Semet Solvay Engineering Corp. 45
Skinner Co., M. B. 28
Sprague Meter Co., The 59
Superior Meter Company 51
Titan Valve & Mfg. Co., The 59
United American Bosch Corp. 41
United States Steel Products Co. 7
West Gas Improvement Co. 49

ALFRED I. PHILLIPS

CONSULTING ENGINEER

Rate Development Valuations Reports

Design Management

122 GREENWICH STREET NEW YORK

THE GOODMAN STOPPER

The Reliable Shut-Off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.

523 Atlantic Avenue, Brooklyn, New York

IMPROVED EQUIPMENT — RUSSELL ENGINEERING

Coal Gas Plants—Horizontal Ovens, Benches, Refills, Additions, Repairs, Charging and Discharging Machines

DIVISION OF
COMBUSTION UTILITIES CORPORATION
24 STATE STREET
NEW YORK

Oil Gas Plants—"Refractory Screen" Process for Base—Standby or Peak Loads—On Existing or New Water Gas Sets Low or High B.T.U. Gas

Pipe Corrosion and Coatings

(Continued from page 32)

Columbia Rod

The Shepard Rod employs an external source of electrical energy. The desire to avoid the need for such additional apparatus, suggested the measurement of the current naturally generated in a galvanic cell to predict the corrosiveness of a soil. The electrical circuit is from anode, through the soil acting as an electrolyte, to the cathode, thence by electrical conductor to a measuring instrument and by a second conductor to the point of origin.

The Columbia Rod electrodes or cell poles may be of any two metals, sufficiently separated in the electromotive series to produce a current when connected by an electrolyte, but copper and steel have the advantage of being common, easily machined, resistant to wear and tear besides being sufficiently apart in the series to result in a comparatively large current flow.

A claimed advantage is the mounting on a single rod, in place of the usual two with a Shepard Rod. However, the disadvantage is to secure the same intensity of soil pressure against both electrodes. The effect of this disadvantage is to cause more variable readings than with a two rod apparatus, where the feel of the rod aids in securing a good electrical contact. The bottom electrode on a single rod mounting may have contact, while the one above may have insufficient or even no contact, due to the rod being moved in a circular motion during the forcing into the soil. When an auger is used to facilitate penetration of the rod to the desired depth, it may be desirable in some soils to compact the soil around the two poles, by tamping with a small rod. The augering of a large hole adds to the cost, especially in stony, gravel, sandy or similar soils. When improved highways are encountered, the drilling of large holes in the surfaced section is usually objected to by highway authorities.

The current flowing in a galvanic cell has a value considerably below that in the Shepard type apparatus, and therefore, much more sensitive apparatus is required to measure the current. Such apparatus is more subject to damage than the less sensitive types, although modern sensitive portable instruments are surprisingly rugged.

Angularity of Rod Sides

Soil contact has been the subject of experimentation, with the result that the angularity of the poles, with respect to the vertical axis of the rod, has been found to materially affect the results. Local experimentation may be necessary to determine the most advantageous angularity of the rod sides for the particular conditions encountered in an individual survey.

The area of the electrodes or poles also affects results. Development of the rod resulted in certain conclusions on which the rod is manufactured, but occasional check tests in different soils is advantageous.

The effect that various metals used for electrodes may have, follows the usual principle outlined in the discussion of galvanic corrosion. This factor may be minimized in importance by the universal use of copper and steel, so that results may be compared with surveys by other operators.

Features Affecting Accuracy

The distance between the electrodes affects results, as explained in galvanic cells. As with the use of certain metals, the advantage of making comparisons possible accrue from the establishment of a standard separation between electrodes, and providing equal areas identically distributed.

The conductors used to carry the current from one electrode to the measuring instrument, and then to the second electrode, may also have an effect on accuracy, particularly if there is any amount of resistance added by these parts of a circuit.

The time which current flows through the Columbia Rod circuit affects the accuracy of interpretation of the reading. The initial current value is high, but rapidly decreases for a short period, then decreases at a slower rate, and finally continues uniform or has a slight but uniformly decreasing rate. Readings of the micro-amperes of current flowing, after 40 to 60 seconds, has been found to be a more uniform criteria of the soils corrosiveness than others. The point at which current begins to flow is sometimes difficult of practical determination, as it may occur when attention is still concentrated on embedding the rod in the soil.

The original current readings were spaced ten seconds apart for forty seconds, and the average of five, including that secured immediately after insertion of the rod used, on which corrosiveness was compared. The difference between the two methods indicates the need for much more extensive application of the rod before its general success may be judged. The rod has been found to offer possibilities by successful correlation of readings and corrosiveness in certain soils.

(Continued in February issue)

ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P C

Manufacturers of All Kinds of Gas Apparatus

NEWARK, NEW JERSEY

Equally Accepted
. . . IN EVERY COMMUNITY

AUTOMATIC CONTROLS MH

THE
GAS COMPANY
AND
MINNEAPOLIS - HONEYWELL AUTOMATIC CONTROLS

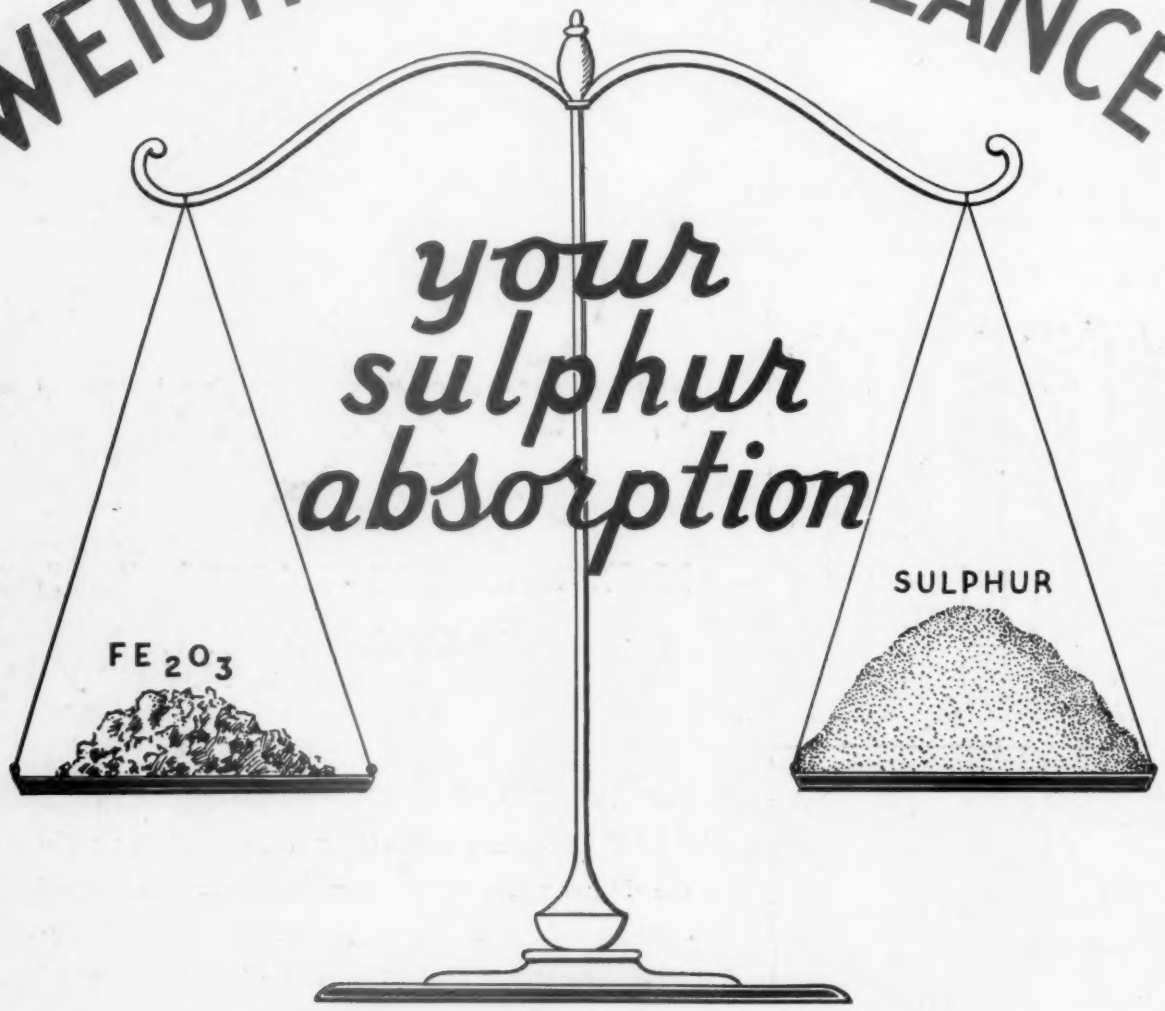
DEPENDABLE CONTROLS COST LESS THAN SERVICE

YOUR company enjoys the confidence of the people in the community it serves. The same feeling of confidence holds true as regards Minneapolis-Honeywell automatic controls. More than half a century of automatic control experience with countless laboratory and field research are behind every Minneapolis-Honeywell control system. Give your customers every chance to be satisfied with gas heat. Recommend and install complete Minneapolis-Honeywell controls on every job. Minneapolis-Honeywell Regulator Company, 408 East 28th Street, Minneapolis, Minnesota. Branch and distributing offices in all principal cities.

MINNEAPOLIS-HONEYWELL
Control Systems

BROWN INDUSTRIAL INSTRUMENTS FOR INDICATING, RECORDING AND CONTROLLING

WEIGH IN THE BALANCE



Connelly's Oxide and Mixed Iron Sponge carry more FE_2O_3 . . .

Remember this when ordering

CONNELLY IRON SPONGE & GOVERNOR CO.

3154 S. California Ave.
Chicago, Ill.

200 S. Second St.
Elizabeth, N. J.

New England Agent: T. H. Piser, Wellesley Hills, Mass.